THREE MATHEMATICS

MODULE 8

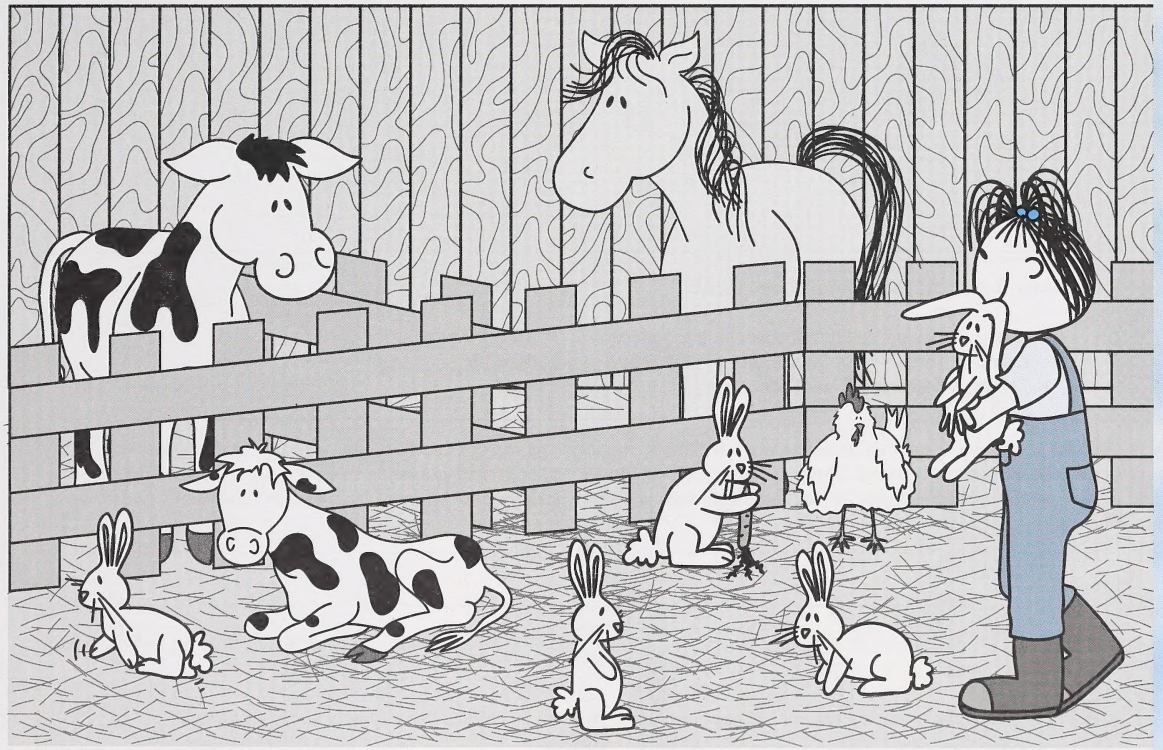
SPACE AND SHAPE

Learning Technologies Branch

Alberta LEARNING

GRADE THREE MATHEMATICS: MODULE 8

SPACE AND SHAPE



Learning Technologies Branch

Alberta LEARNING

Grade Three Mathematics
Module 8: Space and Shape
Student Module Booklet
Learning Technologies Branch
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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	

You may find the following Internet sites useful:

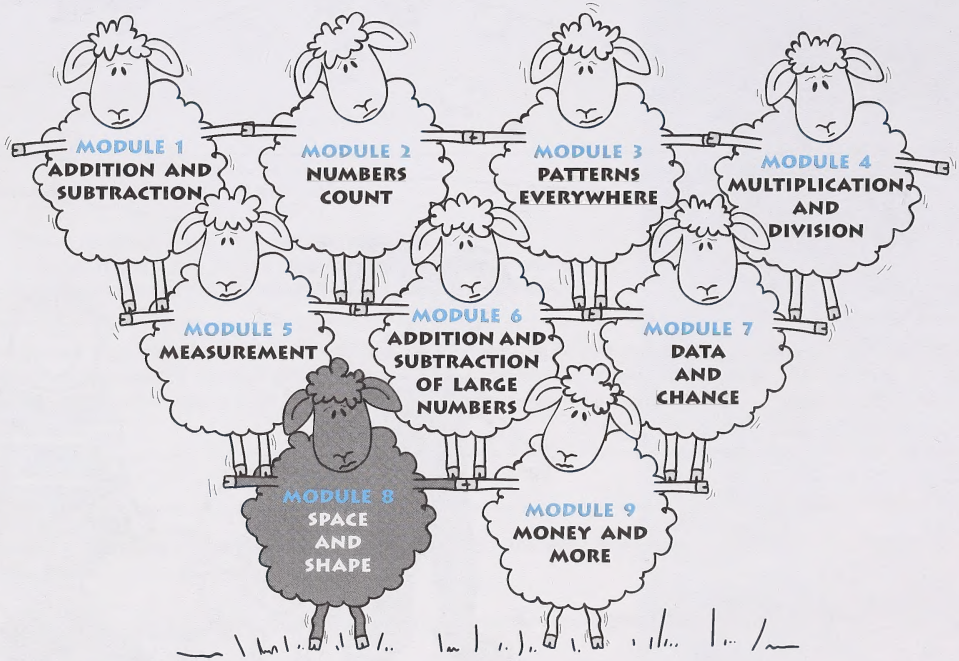
- Alberta Learning, **http://www.learning.gov.ab.ca**
- Learning Technologies Branch, **http://www.learning.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

WELCOME
TO GRADE THREE MATHEMATICS

You may not realize it, but you use mathematics many times every day. You are using math when you count the money in your pocket, find a date on the calendar, or sort your toys. As you work through Grade Three Mathematics you will learn how to do many new things. You will also learn how math can be useful in solving everyday problems.

Each unit in the Grade Three Mathematics course is called a **module**. Read the titles of the modules below to find out what you will learn about this year.



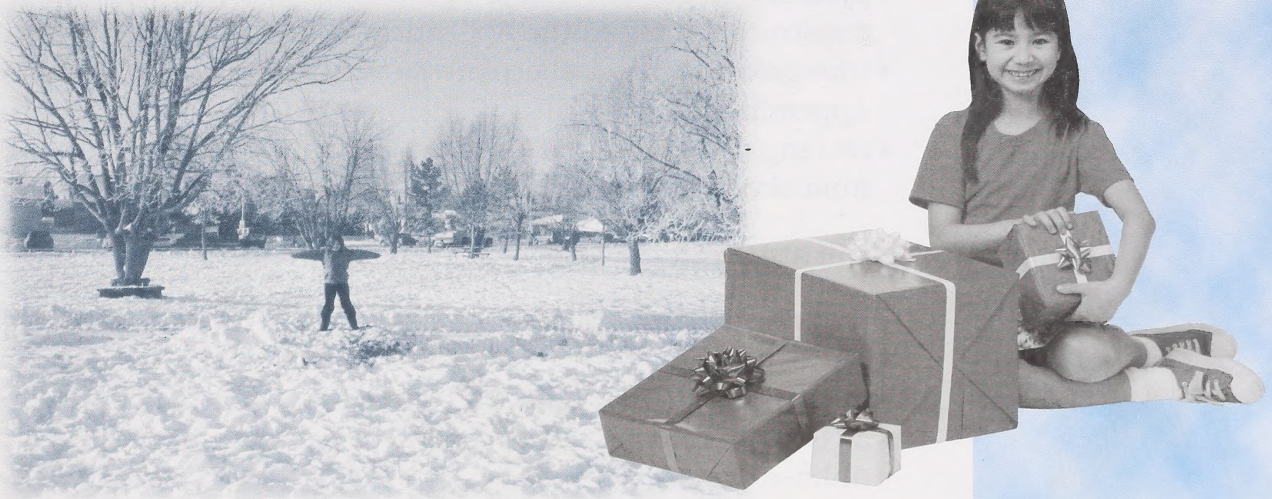
CONTENTS

SPACE AND SHAPE

You know that everything solid around you has a shape. If you look around, you will see a variety.

In this module, you will learn more interesting things about objects and their shapes. You will construct some shapes on your own!!

Also you will practise following and tracing a path according to specific instructions. You'll have fun giving and following directions. It's an exciting module, so let's get started!



MATERIALS FOR MODULE 8

Help your student gather these materials and place them in the Math Box for this module. Remove and store materials from previous modules that you will not need for this module.

For Module 8, you will need a set of geometric solids, including a cone, cube, sphere, cylinder, pyramid, triangular prism, and rectangular prism. You may purchase this set, make the solids using the nets in the Appendix, or use solids found in your home as follows:

- cone—an ice-cream cone, cone-shaped cup, or party hat (Glue a solid face on the open end.)
- cube—dice, sugar cube, or alphabet block
- sphere—a rubber ball, tennis ball, or baseball
- cylinder—a variety of cans, rolls of toilet paper or paper towels (Tape or glue solid faces on the ends.)
- pyramid—a gift box with a square base and four triangular sides or construct the net in the Appendix.
- triangular prism—a chocolate-bar box or construct the net made in the Appendix
- rectangular prism—variety of at least three empty boxes, such as a box from shoes, toothpaste, soup, pudding, or cereal

You will also need the following:

- drinking straws
- modelling clay
- pattern blocks or interlocking cubes
- alcohol thermometer with a vertical Celsius scale
- unlined paper
- 4 index cards
- globe, atlas, or map
- scissors
- pencil crayons
- beans, coloured cubes, or pennies

USING THE "ANSWER KEY TO THE SELF-MARKING ACTIVITIES"

You will be checking your own answers in this module, just as you did in Modules 6 and 7.

This icon tells you to use the "Answer Key to the Self-Marking Activities in the Appendix."

Be sure that you have completed your work before checking the answers. Look carefully for the correct day, lesson, and question number. Then compare your answer with the Answer Key. If your answer is not correct, can you tell why? If you don't understand why you made the mistake, discuss it with your home instructor.

You will use self-marking activities in grade four, so it is important to do this correctly.

Continue to monitor the student as he or she uses the self-marking activities. Be sure that the student completes the activities in the Student Module Booklet before looking at the answers. Explain that the student's own wording may not be exactly the same as the answer, but the meaning should be the same.

DAY 1: SHAPES AND SOLIDS

It is fun to find interesting shapes and solids in the world around us! They are found everywhere! Many you are even able to eat! Can you recall how to describe them?

Today, you will review all you have learned about shapes and solids.

LESSON 1

For her birthday, Sarah received a beautiful big book that had pictures of different places around the world. She showed it to her friend Kyle. These are some of the pictures they saw.

Kyle noticed that the pictures showed many different shapes that he had learned about. Can you see some of the shapes too?

DAY 1

Review the names of the 2-D shapes (triangle, rectangle, square, half-circles and circles).

Look at the following pictures. Can you name the shapes?

Remind the student that 2-D stands for two dimensional. That means it can be measured two ways because it has two dimensions—length and width. Anything two dimensional is flat, because it can only be measured two ways.

Triangles, **rectangles**, **squares**, and **circles** are shapes that you see everyday. They're called **2-D shapes**. What does 2-D stand for?

Two-dimensional, or 2-D shapes have only two dimensions—length and width. They can be measured in those two ways only.

With your student, look for 2-D shapes in common 3-D objects. Look at a pencil, crayon, eraser, book, desk top, picture, lamp, window, clock or doorframe to identify shapes.

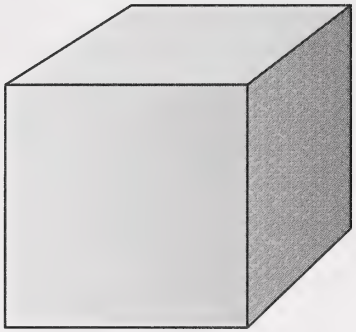
There are 2-D shapes all around you. Look around your room for flat objects or 2-D shapes. Tell your home instructor what you found.

LESSON 2

The shapes you identified in Lesson 1 were squares, rectangles, triangles, half-circles, and circles.

Now you will look at a solid. A **solid** is an object with length, width, and depth.

Provide the student with a cube.



Examine the solid your home instructor just gave you. Think of words you could use to describe it. Write all the words on the following lines.

Discuss all the possible words used to describe the cube, such as sides, corners, squares, and so on.

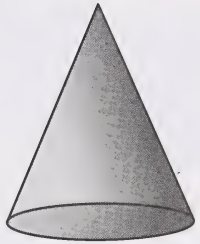
_____

_____

DAY 1

Provide the student with a cone.

Now look at a different solid.



Discuss with the student all the possible ways to describe the cone (smooth, pointed, one flat round side, circle on the bottom, and so on).

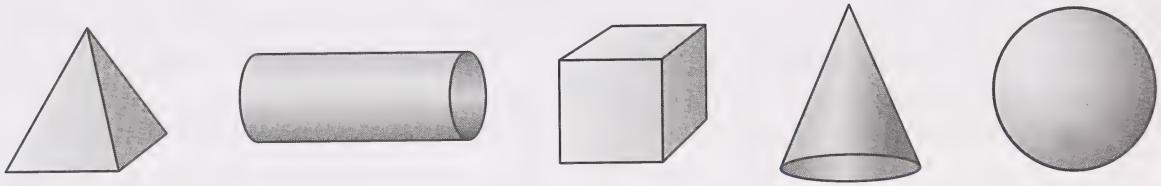
What words could you use to describe it? Write your words on the lines.

_____

_____

Provide the student with the following geometric solids: sphere, square-based pyramid, cone, cube, cylinder. The nets for these are in the Appendix. For the sphere choose any round object.

Now look carefully at the following solids.



Have the student describe them orally. Encourage the use of words, such as round on one or more sides, smooth, points, corners, squares, circles, triangular and rectangular sides.

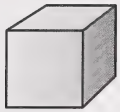
Describe each one to your home instructor.

See how well you remember the names of the following solids.

1. From the following words, choose the correct name for each solid and then write the name on the line beside it.

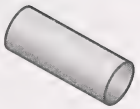
cylinder **sphere** **cone** **pyramid** **cube**

a.  _____

b.  _____

c.  _____

d.  _____

e.  _____

If your student has difficulty, encourage him or her to first write the names of the solids he or she knows for sure and then to figure out the ones left.

For review, hold up each geometric solid in turn and ask the student to identify each one.

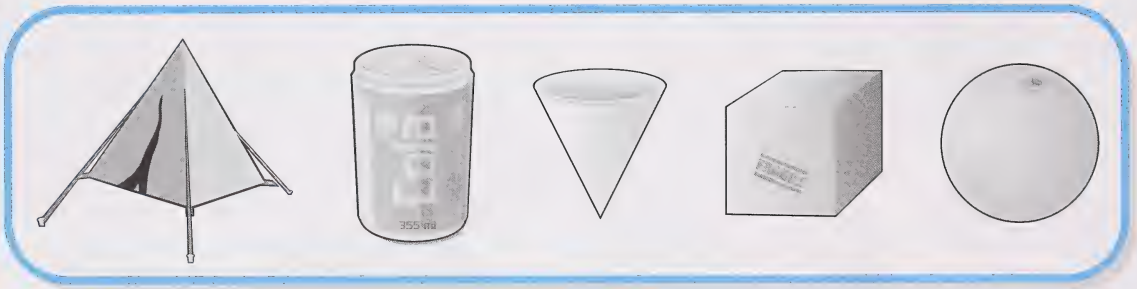
Name each solid your home instructor holds up.

Did you get them right? If you did, good for you!

Explain that mathematicians are people who study mathematics.

Do you remember the name given to the study of objects and shapes? When mathematicians study solids and shapes, it's called **geometry**. Pyramids, cones, spheres, cubes, and cylinders are called **geometric solids**. You are a mathematician studying geometric solids!

Look at the following geometric solids that are in everyday life. Geometric solids are also known as **3-D** or **three dimensional**.



Discuss with the student that 3-D stands for three dimensional. That means it can be measured three ways because it has three dimensions—length, width, and depth. Unlike a flat 2-D object, the added dimension of the 3-D object allows you to measure how deep it is—its depth.

Do you remember what 3-D stands for? Tell your home instructor.

Three dimensional means it can be measured three ways—length, width, and depth. A 2-D object is flat with only length and width. A 3-D object has depth, too. Can you see the depth in the 3-D shapes?

There are many 3-D, or three dimensional objects all around you. Look inside and outside your home for more.

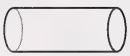
2. On the lines, name everyday objects that look like the geometric 3-D solids shown.

_____

_____

_____

_____



_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

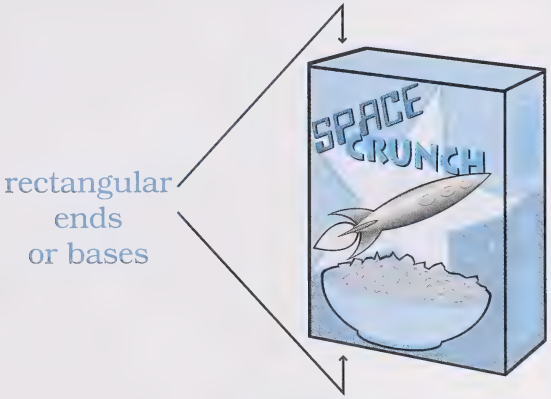
Help the student find geometric solids in everyday objects.

This mountain is called Pyramid Mountain.

LESSON 3

In Lesson 2, you looked at some geometric solids. Find an object that is shaped like a toothpaste or cereal box. This solid is an example of a **prism**.

A **prism** is any 3-D solid with two ends or bases the same and at least three flat rectangular sides. A prism is named for the shape of its ends or bases.

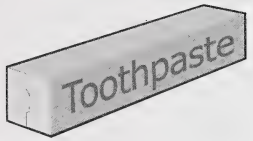


The ends or bases on this box are rectangles, so this solid is a **rectangular prism**.

The ends or bases on this solid are triangles, so this solid is a **triangular prism**.

Rectangular prisms are common in your home. You may have discovered some when you looked for solids in Lesson 2. Now you know that these types of solids are called prisms.

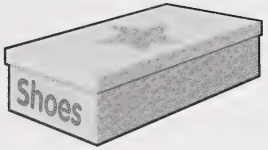
Write the correct name (**rectangular prism** or **triangular prism**) beside each of the following solids.

1. 

_____

2. 

_____

3. 

_____

4. 

_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITIES

If you do not have magazines to cut up, you could use pictures from old newspapers, catalogues, or sales flyers.

You will need magazines that you can cut up for this activity.

1. Find pictures in magazines that have things in them shaped like circles, rectangles, squares, and triangles.

   Cut the pictures out and glue them to a sheet of paper. Outline the shapes with a red marker and label them. Tell your home instructor about the shapes you found.

2. Find pictures of objects that are geometric solids. Cut these out and mount them. Compare the shapes to the solids. Tell your home instructor about them.

Go to Assignment Booklet 8A.

DAY 2: FACES, EDGES, AND VERTICES

You have studied the names of different geometric solids and some ways to describe them.

Today you will learn special mathematical words to describe these geometric solids!

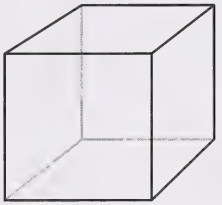
Mathematicians—are you ready?

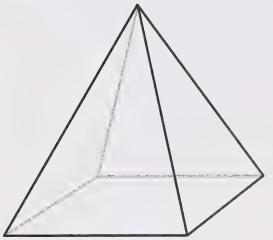
LESSON 1

Take out your geometric solids.

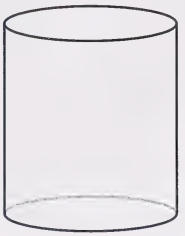
Assist the student with the solids. Have the student answer the questions orally. Discuss how they are similar. (Each has sides, corners, and edges.) Then discuss how they are different. (The pyramid comes to a point and has five sides while the cube has six sides all the same size and no point.) Continue to discuss the comparisons with the other solids after the student examines them carefully.

Look closely at the cube and pyramid. How are they the same? How are they different? How can you describe the sides of each one? How many edges are there on each? Tell your home instructor.

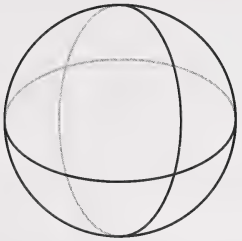


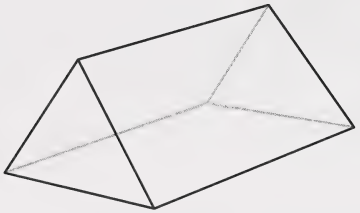


Now compare the cylinder with the cone. How are they similar and different? How can you describe the sides of each one? How many edges are there on each?



Compare the sphere with the triangular prism. How are they similar and how are they different? How can you describe the sides of each one? How many edges are there on each?

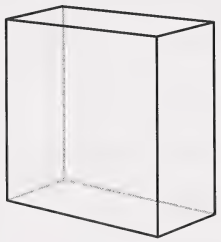




Do you remember what a prism is?

A prism is any solid object that has two ends or bases that are the same and at least three flat rectangular sides or faces.

Look closely at the rectangular prism.



1. Does it have any sides or faces that are rectangles? If so, how many?

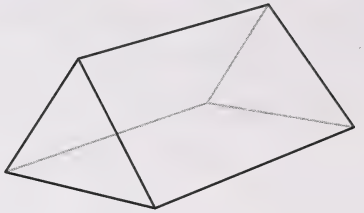
_____

2. Why is it called a prism? _____

Ensure the student understands the term *prism* before going further with the lesson. A rectangular prism has two ends or bases the same and four rectangular sides. Explain that a triangular prism has triangular ends that are the same with three rectangular sides.

DAY 2

Look closely at the triangular prism.



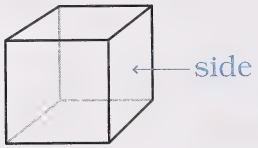
3. Does it have any rectangles for faces? If so, how many? _____

_____

4. Why is this called a prism? _____

_____

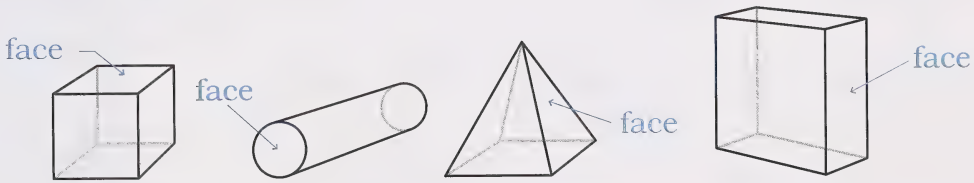
LESSON 2



Look at the picture of the cube. The arrow is pointing to one side.

When you talk about a side in geometry, you can use another name. Do you remember what it is?

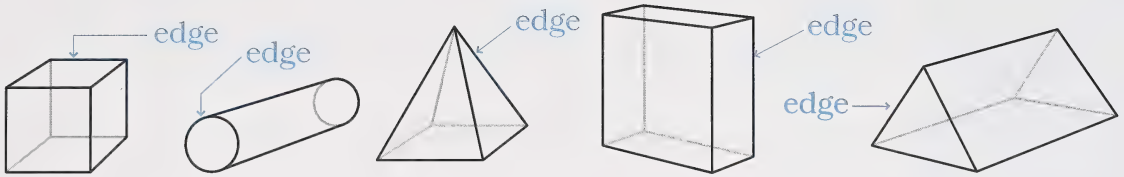
In geometry, a side is called a **face**. One face on each of the following solids is labelled.



How many faces in all does a cube have? A cylinder? A pyramid? A rectangular prism? Count them with your home instructor.

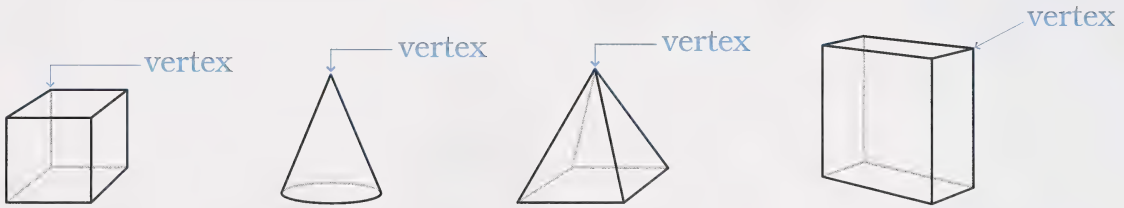
The place where two faces meet is called an **edge**.

One edge on each of the following solids is labelled.



How many edges in all does a cube have? A cylinder? A pyramid? A rectangular prism? A triangular prism? Count them with your home instructor.

The place where two edges meet to form a point or corner is called a **vertex**. Vertex is a Latin word and it means "a meeting place." When you have more than one vertex, you say **vertices**.



How many vertices in all does a cube have? A cone? A pyramid? A rectangular prism? Count them with your home instructor.

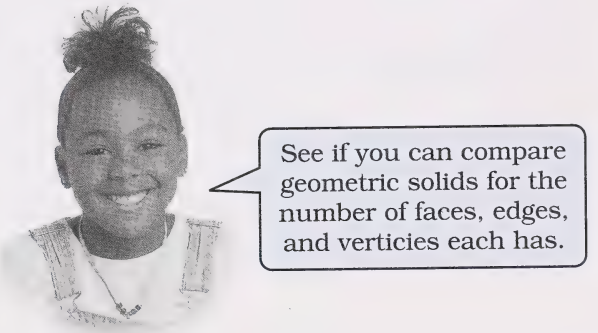
Look at the sphere.

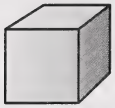
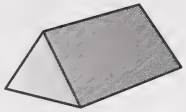
Do you see that it has no sides or faces? Therefore it has no edges and no vertex.

Can you think of a solid that has faces and edges but no vertex? What is it? If you said a cylinder you are correct.

In the following chart, write the correct name beside each geometric solid. Then count the number of faces, edges, and vertices of each one and record the data on the chart.

Place the following solids in front of the student: cube, square-based pyramid, triangular prism, cone, rectangular prism, sphere, cylinder. Ensure the student understands the instructions before beginning the activity.



Solid	Name of Solid	Number of Faces	Number of Edges	Number of Vertices
				
				
				
				
				
				
				

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITIES

MAGIC BOX

Put all your 3-D geometric solids into a box or bag. Reach in and feel one without looking at it. Describe it to your home instructor. Your home instructor must guess what the shape is. Remember to use your new geometric words.

Then ask your home instructor to reach in and feel a shape and describe it to you. Now you must guess what the shape is. Take turns doing this until all the shapes have been described.

Are you ready for your timed exercise? Ask your home instructor to time you for 2 minutes. Write how many you completed.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work. Remember to record the number correct on your Math Facts Graph for Day 2 in the Appendix.

TIMED EXERCISE: 2 MINUTES

$3 \times 7 =$ _____ $2 \times 7 =$ _____ $9 \times 5 =$ _____ $5 \times 4 =$ _____ $5 \times 3 =$ _____ $7 \times 5 =$ _____ $6 \times 2 =$ _____

$4 \times 8 =$ _____ $4 \times 7 =$ _____ $2 \times 0 =$ _____ $3 \times 1 =$ _____ $9 \times 5 =$ _____ $3 \times 3 =$ _____

2×3	7×2	2×5	9×1	9×0	6×6
6×4	6×5	8×6	4×4	6×7	9×3

There is no assignment in the Assignment Booklet for Day 2.

Number completed	
Number correct	

DAY 3: FACES EVERYWHERE!

Look at all the faces! Can you see all the different shapes?

Sarah decided that she had a round-shaped face. Sarah thought her mom had a square-shaped face. What shape is your face? Are there different shapes of faces in your family?

LESSON 1

The 3-D geometric solids you are studying contain four basic 2-D shapes or faces.

Beside each picture, write the name of the 2-D shape.

1. 

_____

2. 

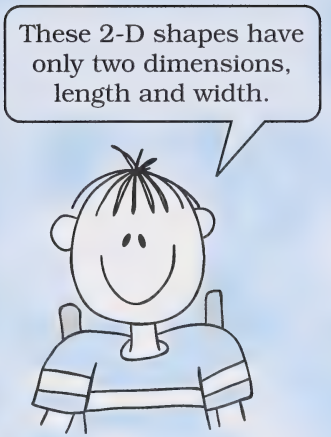
_____

3. 

_____

4. 

_____



Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

LESSON 2

As you know, some solids have more than one type of face. However, one solid doesn't even have a face!

1. Write the name of the solid that has no face. _____

Take out your geometric solids.

Provide the student with the seven geometric solids: cone, cylinder, cube, triangular prism, rectangular prism, square-based pyramid, sphere. Check that the student understands the instructions. Allow the student time to count the faces of each solid.

2. Carefully examine each geometric solid as you fill out the following chart. Write the name of the 3-D solid, and then beside it write the number of each shape of face that solid has. The first one is completed as an example for you.

Solid	Name of Solid				
	cube	6	0	0	0
					
					
					
					
					
					

Discuss what shape the student's face might be: square, round, rectangular, triangular, or even oval. Talk about the shape of your own face, and draw a picture of yourself as well on a separate piece of paper.

3. Look in the mirror at your own face. What shape does it resemble? Draw your face in the following box.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITIES

YES OR NO GAME

Play this game with your home instructor, a friend, or family member. You will need a set of geometric solids.

- The first player thinks of a solid and writes the name on a piece of paper so that no one else can see.
- The second player asks questions to try to guess what the solid is. The questions can only be answered with a "yes" or a "no."
- Take turns being the first player to start.
- Keep a tally of the number of questions each player asks.
- See who can ask the least number of questions to guess the solid.
- Discuss what kind of questions are good ones to ask.

Go to Assignment Booklet 8A.

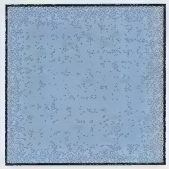
DAY 4: IDENTIFYING SOLIDS AND FACES

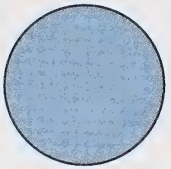
Can you tell which everyday objects look like geometric solids? Some you play with. Some you work with. Some may even be good enough to eat! Can you identify their faces?

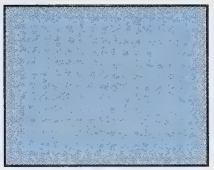
You may be surprised at all the solids you discover!

LESSON 1

In Day 1, you looked for objects in and around your home that had the following 2-D shapes:

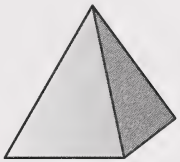

square

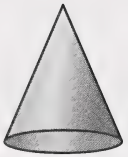

circle

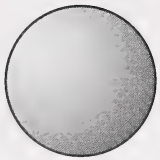

rectangle

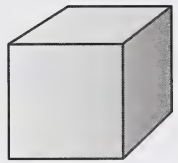

triangle

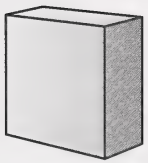
You also named 3-D objects that look like these geometric solids:


square-based pyramid

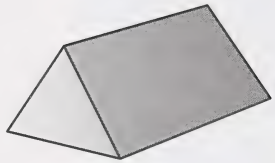

cone


sphere


cube


rectangular prism


cylinder


triangular prism

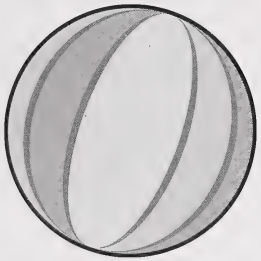
Find objects in everyday life that are shaped like each of the geometric solids. In each of the following boxes, draw a picture of each object you found, and then write the name of the geometric solid that it looks like.

DAY 4

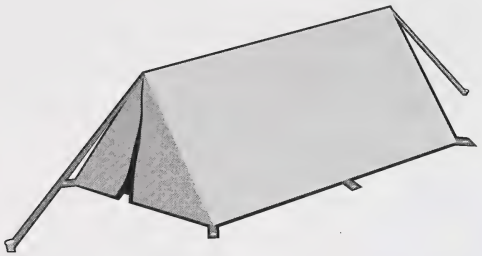
Help the student find as many different geometric solids in everyday objects as possible. Check the drawings with the student. There should be different solids represented, for example: an orange (sphere), a can (cylinder), a box of crackers (rectangular prism), a sugar cube (cube), an ice-cream cone (cone), a tent (pyramid or triangular prism). Ensure the solid is correctly named under it.

_____	_____
_____	_____
_____	_____
_____	EVERYDAY LIFE OBJECTS

Look at these pictures. Write the name of the geometric solid that you see in each one.

1. 

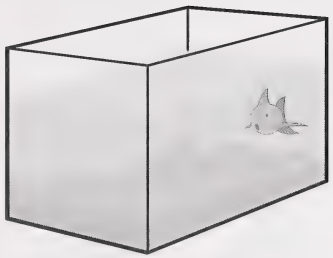
_____

2. 

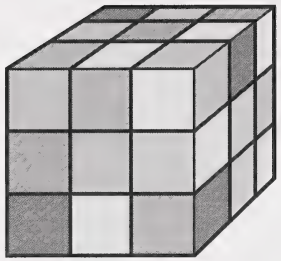
_____

3. 

_____

4. 

_____

5. 

_____

6. 

_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

Help the student look for two different-sized boxes, such as a toothpaste box, a box of jelly powder, a tissue box, a box of crackers, or a cereal box. Also help your student locate a cone, a square-based pyramid, a cylinder, and a triangular prism.

LESSON 2

For this activity, you will need two different-sized boxes, a cone, a square-based pyramid, a cylinder, and a triangular prism. Look back at the 3-D objects from Lesson 1 for help if you need to.

Take out unlined paper.

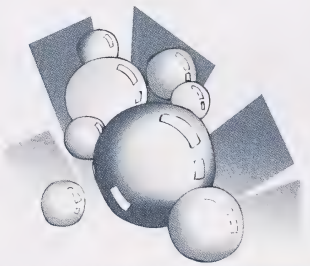
Trace the largest face of each object on separate sheets of paper. Identify the shape and write the name on the face you drew.

Can you use the 3-D object that is shaped like a sphere for this activity? Why or why not?

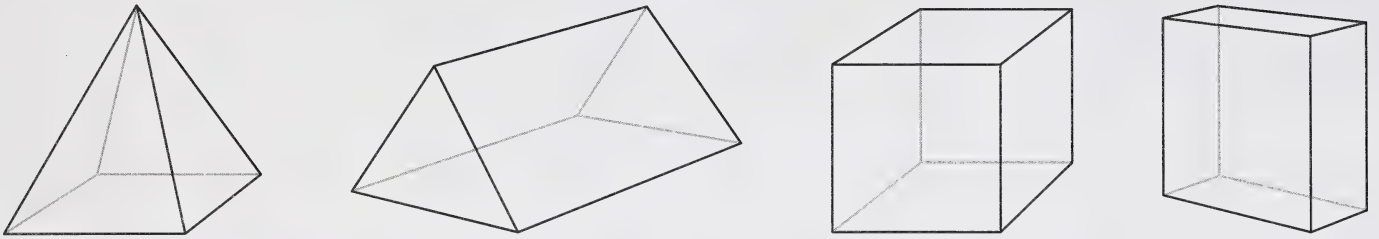
An object that is shaped like a sphere cannot be used because a sphere does not have a face. Check that the faces are correctly identified by the student.

1. _____

_____



Look at the following pictures of 3-D solids.



2. On the lines, write the name of the 3-D solid that contains each set of faces shown.

a. 

_____

b. 

_____

c. 

d. 

EXTENSION ACTIVITIES

SOLIDS MATCH

Put all your geometric solids in a bag. Your home instructor will give you the name of a 3-D solid. Without looking, you must find the correct solid in the bag.

Go to Assignment Booklet 8A.

DAY 5: PRISMS AND BASES

Do you know a city like this one that is full of many different shapes?

To examine shapes of prisms and pyramids is your work for today and Day 6. You'll begin by looking closely at different prisms today. By looking at the shape of their ends or bases, you will learn how to name them.

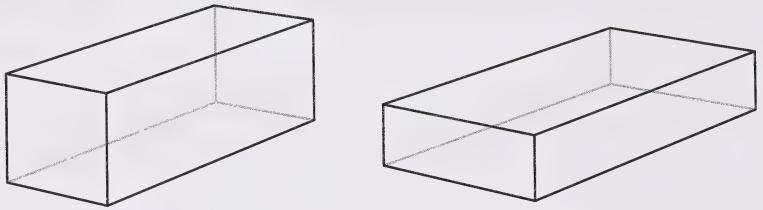
For this lesson, provide the student with the following solids as needed:

- rectangular prism with two square ends
- rectangular prism with rectangular ends
- triangular prism
- three different pyramid solids

Nets to construct these are provided in the Appendix. Have the solids ready prior to beginning today's lesson.

LESSON 1

Examine the two rectangular prisms your home instructor has given you.



1. How many faces does each one have? _____
2. How many edges does each one have? _____
3. How many vertices does each one have? _____
4. How are the two rectangular prisms different from one another?

_____

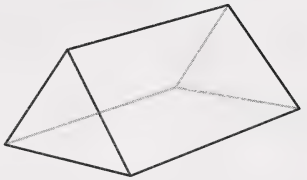
_____

5. How are they the same?

_____

_____

Now look at the triangular prism.



6. How is it different from the rectangular prisms?

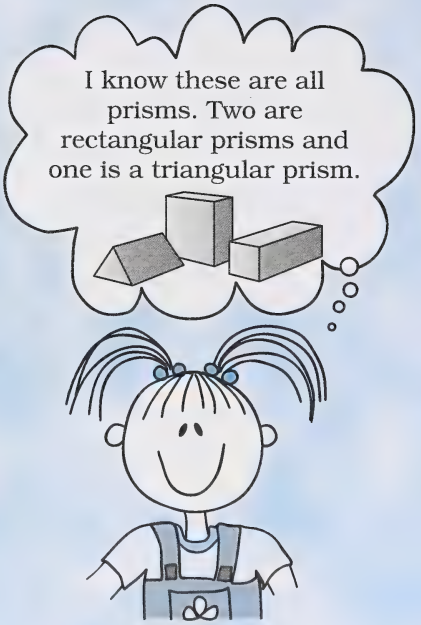
_____

_____

7. How do you know it is a prism?

_____

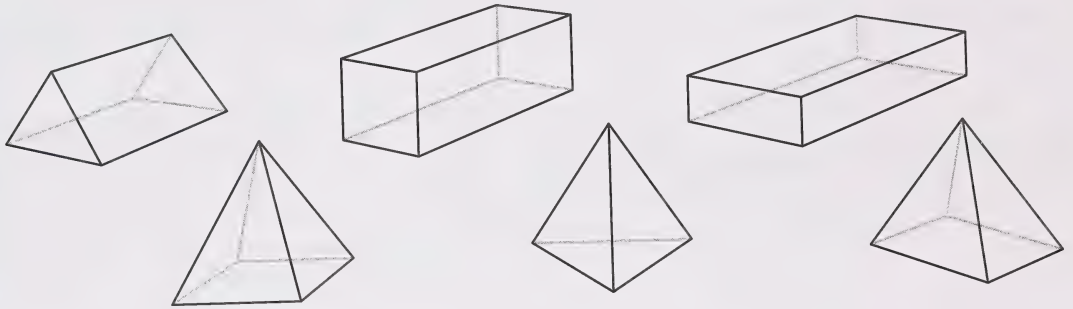
_____



DAY 5

Give the student the three pyramid solids along with the three prisms.

Your home instructor has given you three pyramid solids along with your prisms. Look at the six geometric solids together.



Think of a way to sort the solids.

Assist the student with sorting them according to the shape of the faces, the number of faces, or whether they come to a point or not.

In the following box, draw one of the ways you sorted the six solids.

Explain to your home instructor why you sorted the solids the way that you did.

8. How do you know which ones are pyramids?

_____

_____

_____

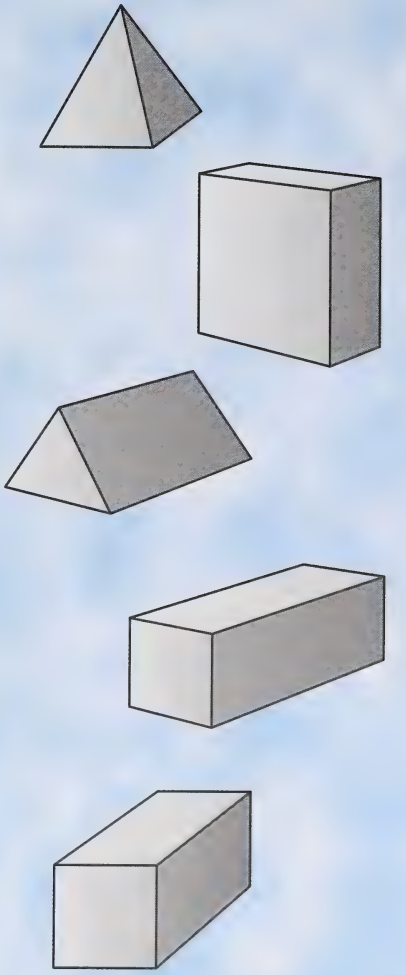
9. How can you tell the others are prisms?

_____

_____

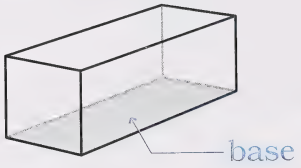
_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.



LESSON 2

Look at the six solids again. They are all resting, or standing, on one of their faces. There is a special word in geometry for this face. It's called a **base**. A base is a surface of a shape or solid on which it can stand.



Describe a prism. _____

_____

_____

Check the answer with the student: A prism is any 3-D solid with ends or bases the same and at least three flat rectangular sides.

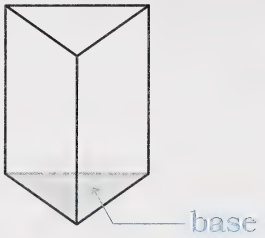
The ends or bases of a prism must be the same.

If all the faces are rectangles, then it is called a rectangular prism. **Remember squares are rectangles too, so if the faces are square it is still called a rectangular prism.**

If at least three faces are rectangles and the two bases are triangles, it's called a triangular prism.

The faces that are not rectangles give the name to the prism.

Look closely at this triangular prism.



What shapes are its faces? _____

_____

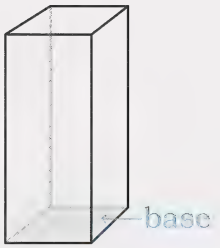
Check with the student that the faces are triangles and rectangles.

What shapes are the two bases of this prism? _____

There are two triangular faces on it. They are the bases of the triangular prism. And since they are not rectangles, they give the prism its name. It's called a **triangular** prism.

Have the student answer orally. There are two triangular faces in this prism. Since they are not rectangles, they give the prism its name, triangular prism. Ensure the student understands this concept before proceeding.

Examine the following rectangular prism.



What shapes are its faces? _____

Check with the student that the faces are rectangular and square.

What shape are the bases in this prism? _____

What shapes are its other faces?

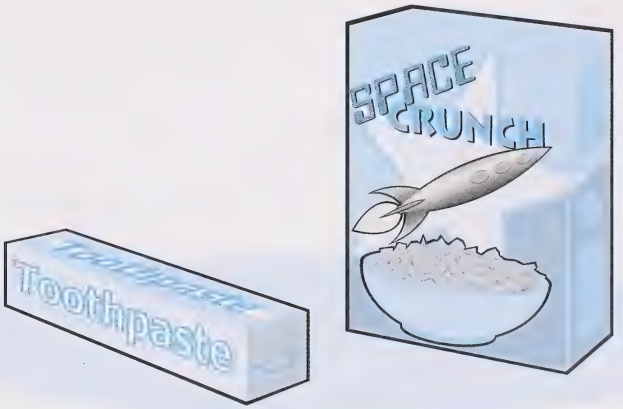
_____

Since a square is a type of rectangle, the prism is called a rectangular prism.

Why is this prism called a rectangular prism? _____

_____

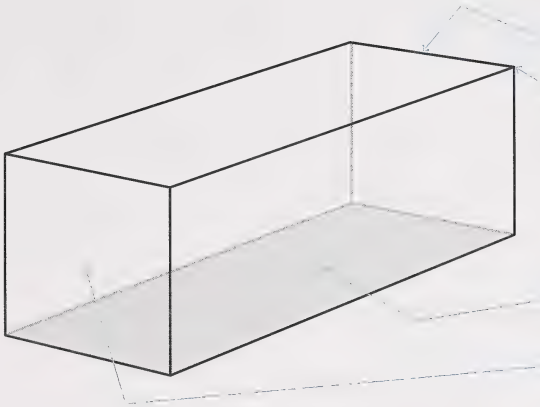
To name a prism correctly, you must remember that the faces that are not rectangles give the name to the prism. Even though this prism has two square faces, it is still called a rectangular prism. That's because a square is a kind of rectangle. So both of the prisms below are called rectangular prisms.



Choose the correct word from the following box to identify the name of each part the arrow is pointing to on the pictures of solids. Then write that word on the line.

face	edge	base	vertex

1.



a. _____

b. _____

c. _____

d. _____

2.

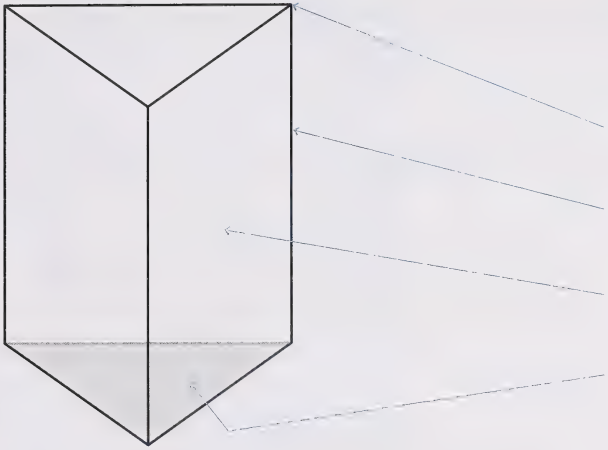
a. _____

b. _____

c. _____

d. _____

3.



a. _____

b. _____

c. _____

d. _____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

Are you ready for your timed exercise? Ask your Home Instructor to time you for 2 minutes.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.
Remember to record the number correct on your Math Facts Graph for Day 5 in the Appendix.

TIMED EXERCISE: 2 MINUTES

$4 \times 7 =$ _____ $3 \times 9 =$ _____ $7 \times 3 =$ _____ $6 \times 6 =$ _____ $4 \times 4 =$ _____ $2 \times 1 =$ _____ $7 \times 2 =$ _____

$7 \times 5 =$ _____ $7 \times 7 =$ _____ $2 \times 2 =$ _____ $7 \times 0 =$ _____ $5 \times 2 =$ _____ $3 \times 3 =$ _____

6×3	7×1	8×5	9×4	9×2	7×6
5×4	5×5	2×6	3×4	6×5	2×3

Go to Assignment Booklet 8A.

Number completed	
Number correct	

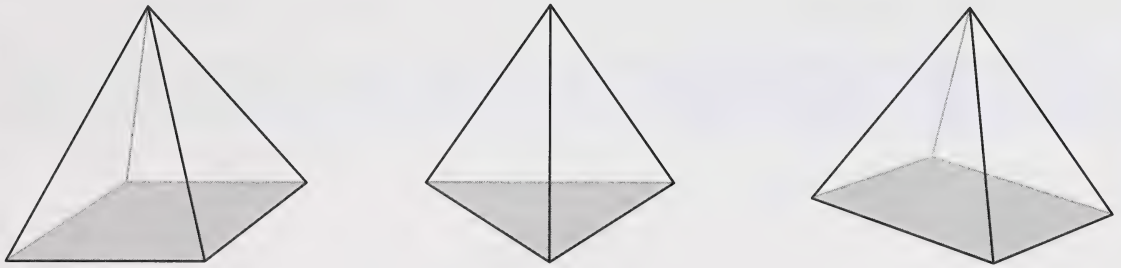
DAY 6: PYRAMIDS AND BASES

You'll learn about pyramids today. You will even build your own pyramids! Pay particular attention to their bases.

The pyramids below provide homes for many different plants.

LESSON 1

Look at the 3 geometric solids your home instructor has given you.



Provide the student with a triangular, rectangular, and square-based pyramid. Allow the student time to examine the pyramids.

What kind of solids are they? _____

What are the shapes of the faces in the pyramids? _____

_____

Check that the student understands that the solids are all pyramids and that the faces are squares, triangles, or rectangles.

Look at the first pyramid. What do you think that one is called?

If you said **square-based pyramid**, you were right! Why do you think it's called that?

The next pyramid is called a **triangular-based pyramid**. Why do you think it is called that? The last one is called a **rectangular-based pyramid**. Why do you think it is called that?

Talk about the three types of pyramids with the student and how the base of the pyramid helps name it. Check that the student understands that the triangular-based pyramid's faces are all triangles and the rectangular-based pyramid has one rectangular face with its other triangular faces.

Show the points on each of the three pyramids and point out how they are opposite the base of each one.

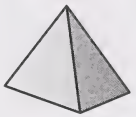
Check that the square-based pyramid has four triangular faces, one square face.

The triangular-based pyramid has four trianglar faces and no square or rectanglar faces.

The rectangular-based pyramid has four triangular faces and no square faces but one rectangular face.

The face that the solid stands on is called the base. The base of a pyramid is easy to tell because it is always opposite the point. The base helps you to name the pyramid.

Examine each pyramid. How many kinds of faces does each one have?

Type of Pyramid	Triangular Faces	Square Faces	Rectangular Faces
 Square-based pyramid			
 Triangular-based pyramid			
 Rectangular-based pyramid			

A triangular-based pyramid stands on a triangular face—its base. That is why it is called a triangular-based pyramid.

A square-based pyramid stands on a square face—its base. That is why it is called a square-based pyramid.

A rectangular-based pyramid stands on a rectangular face—its base. That is how it gets its name.

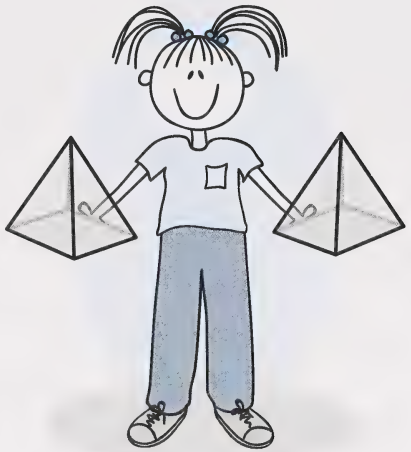
Write the correct word to complete the following sentences.

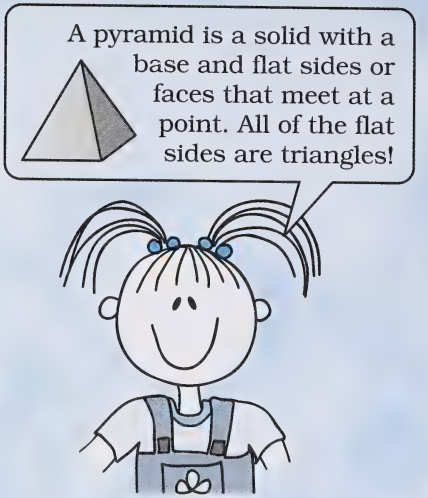
1. A rectangular-based pyramid stands on its _____ face.

   The rectangular face is its _____.

2. A square-based pyramid stands on its _____ face.

   The square face is its _____.





What do you think makes a pyramid a pyramid?

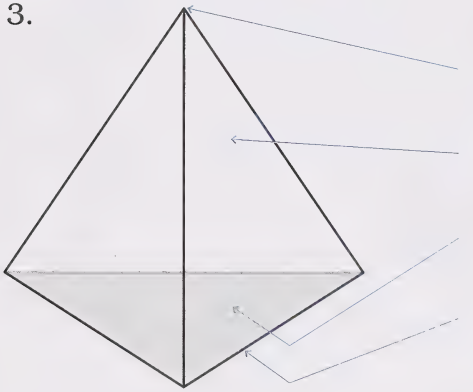
Discuss the definition of the pyramid and review the meaning of all its parts.

A pyramid is a solid that has one base and flat triangular faces that meet at a point.

Using the words in the following box, identify and write the name of each part the arrow is pointing to on the following pictures of pyramids. Then write in the name of each type of pyramid.

face	edge	base	vertex

3.



a. _____

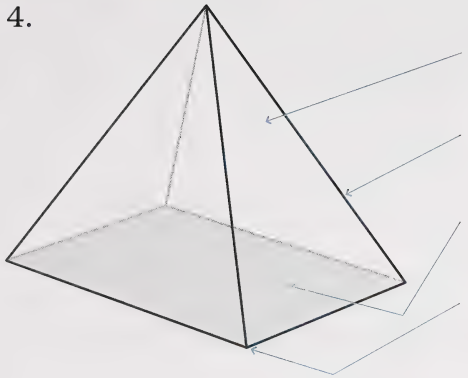
b. _____

c. _____

d. _____

e. The name of this pyramid is a _____.

4.



a. _____

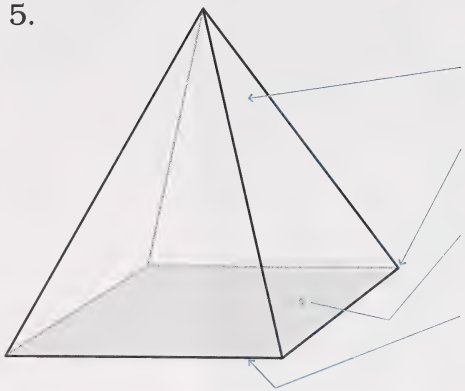
b. _____

c. _____

d. _____

e. The name of this pyramid is a _____.

5.



a. _____

b. _____

c. _____

d. _____

e. The name of this pyramid is a _____.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

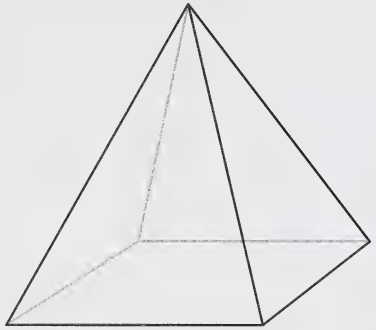
LESSON 2

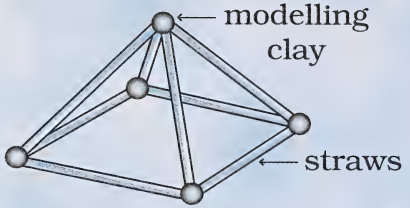
Sometimes it is fun to make solid shapes with straws and modelling clay.

Now it is your turn to make a square-based pyramid and a triangular-based pyramid using straws and modelling clay.

Provide the student with modelling clay and eight drinking straws cut in half. Help the student make the faces.

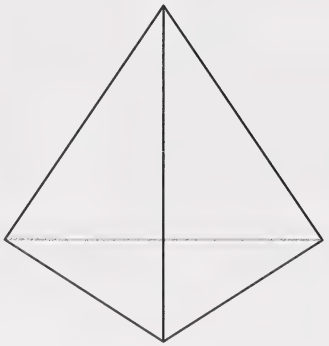
Make the square-based pyramid first, but before you begin, figure out how many faces it has and the shapes of each. How many edges will there be?

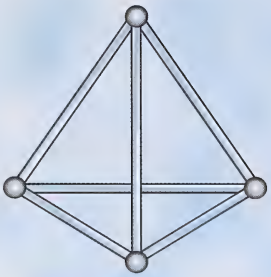




square-based pyramid

Now try to make the triangular-based pyramid. Just as you did with the square pyramid, figure out how many faces it has and the shapes of each. How many edges will there be?





triangular-based pyramid

DAY 6

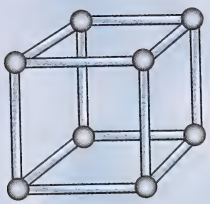
Have the student answer the questions orally. Discuss the pyramids and what the student has learned. Ensure the student understands that the shape of the base names the pyramid.

How are pyramids with square bases similar to pyramids with triangular bases? _____

How are they different? _____

What did you learn about pyramids that you didn't know before? _____

_____



EXTENSION ACTIVITIES

Build models of other geometric solids using straws and modelling clay.

When you have completed the models, display them where members of your family can see them.

Go to Assignment Booklet 8A.

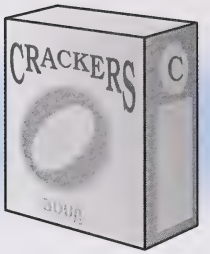
DAY 7: LOOKING AT NETS

In sports, you can probably name many kinds of nets. In geometry, there are different kinds of nets you will learn about today. Did you know that all the 3-D solids you studied have nets?

You will learn a new meaning for net. First, you will look at the net for a rectangular prism.

LESSON 1

Provide an empty box, such as a cereal or cracker box, with the top sealed with tape. Discuss with the student that it is a rectangular prism. It has 6 faces, 12 edges, 8 vertices, and the sides are all rectangles. Examine the box together to see how some edges are folded over and not joined together. Your student may suggest to go to the box factory or cut the box open to see how it was made.

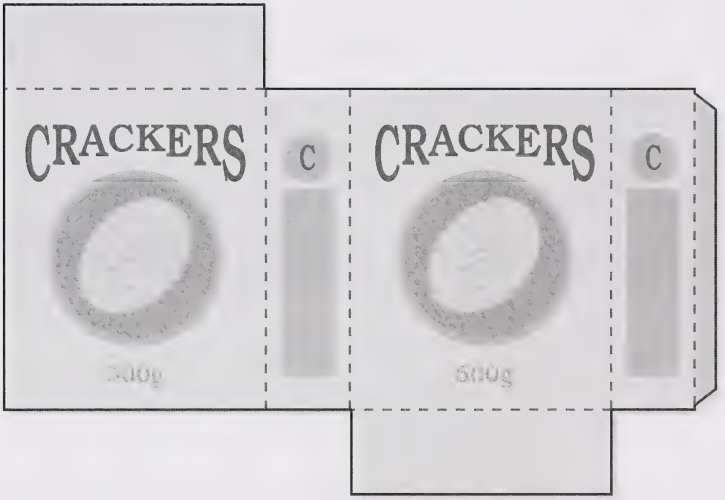


Look closely at the box. Can you describe it?

How do you think the box was made?
How could you find out how it was made?

Cut the top and bottom of the box along three sides with a sharp knife so you have a flap on each end. Use scissors to cut one edge of the box along the side. Open up the box and lay it flat on a surface.

Watch as your home instructor opens up the box and lays it flat. This is how the box was made.



This is the pattern for making the box. The special name for this pattern is a **net**. This net is a pattern for making a geometric solid.

LESSON 2

Now it's your turn to make nets.

Take out several sheets of unlined paper.

Examine your box. What geometric solid is the box shaped like? How many faces does the closed box have? Which of the faces are the same size and shape? What shape are they?

On a separate piece of paper draw what you think the box will look like when you cut it open.

Take out your scissors.

Provide the student with a box shaped like a rectangular prism, such as a toothpaste box, a jelly powder box, or a cracker box.

Have the student answer orally. The student should describe the geometric solid as a rectangular prism with six faces. Help the student to see that the opposite sides are the same size and shape and that the shapes are rectangles. Have the student draw what the net might look like.

DAY 7

Watch as the student cuts the box. Ensure he or she does not cut the faces apart completely. Help the student determine which edges should not be cut.

Discuss your plan with your home instructor before cutting. Decide where to cut your box along the edges so it opens in one piece and can lie flat. Be careful not to cut all the faces apart.

You have just made a net for a rectangular prism! Does it look like the drawing you made?

Provide the student with a second empty box in the shape of a rectangular solid.

Now, you are ready to make another net. Look carefully at the box first, and then sketch this net on paper. This time, cut this box along different edges, but as before, so the box stays in one piece and will lie flat. Make sure you don't cut the faces off.

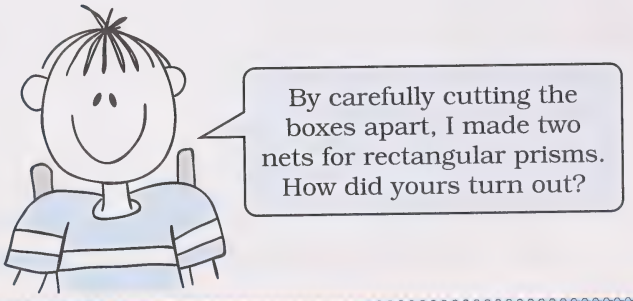
Help the student see that both have six faces and the faces are all rectangles, even though both open up differently.

Compare the two nets you just made. How are they the same? How are they different? Tell your home instructor.

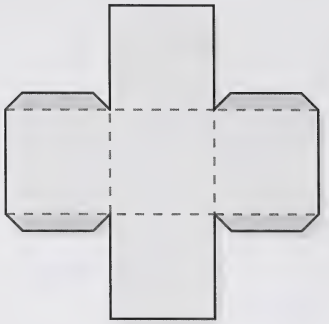
How many faces does a rectangular prism have? _____

Check the answers together with the student. A rectangular prism has six faces. The six faces should be obvious on both nets. Have the student point them out to you. Ensure the student understands that only a net with six faces can make a rectangular prism.

Can you see all six faces on the two nets you made?



Look at the net to the right. Then write your answers to the following questions.

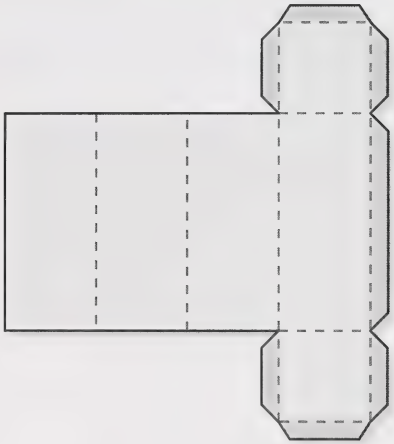


1. Could it be folded to make a rectangular prism? _____

   Why or why not? _____

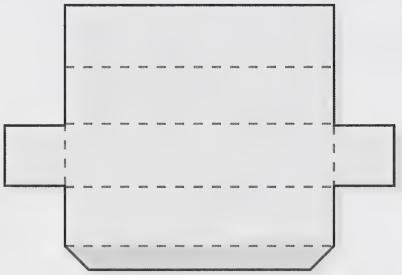
2. Look carefully at the following nets. On the lines, write if the net would be for a **tissue box** or for a **toothpaste box**?

a.



_____

b.



_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITIES

Find a box or two with an unusual shape. Can you figure out what the nets would look like?

Go to Assignment Booklet 8A.

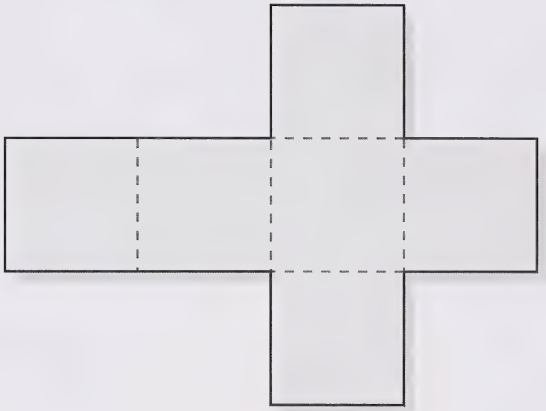
DAY 8: MORE NETS

You looked at nets for rectangular prisms on Day 7. Today, you will learn about and make nets for other solids. Remember to look closely at the kinds of faces the nets should have.

The shape and size of the faces in a net will tell you about the solid it will make.

Check the answers together with the student. Help the student to see there are six faces. They are square and therefore make a cube.

Look at this net. How many faces does it have? _____



What kind of solid do you think it will make? _____

Why? _____

The shapes and sizes of the faces in a net will tell you what solid it will make.

Turn to the Appendix and carefully remove the page that says "Nets."

Have the student answer the questions orally. The student should predict the nets will fold into cubes as all six faces are square.

Look at the four nets. What solid will they make? Why? Tell your home instructor.

Cut out the nets. Then fold them and tape the edges together. Which ones folded into cubes? Was your prediction correct?

Can a cube have more than one net? Now, you know there are many different nets that will make a cube.

Draw a new net and make a cube. It must be different from the nets in the Appendix and the net in this lesson. The following instructions may help you.

TO MAKE A CUBE

1. Draw the net on paper. Remember there must be six faces that are all square. (You can use grid paper, a template, or a cube to help you.)

2. Cut the net out.

3. Fold the net.

4. Tape the edges together.

When you have made your net that folds into a cube, display it where members of your family will see it.

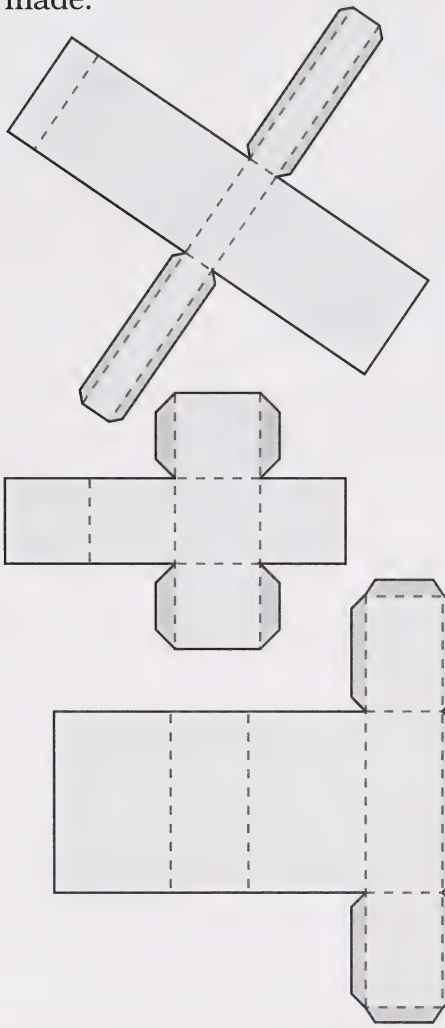
How well do you know nets? Try the following questions to see what you know.

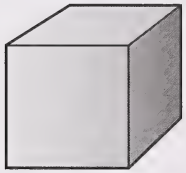
Allow the student time to make the net. It may help to have a template. Draw a 4 cm by 4 cm square on stiff paper to represent one face or use the faces of a cube for a pattern. The student can then trace the square to ensure all the faces are equal and the same size. If you have grid paper, provide it to the student. It will make the tracing, cutting, and folding easier.

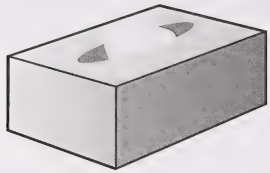
DAY 8

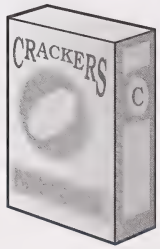
Allow the student time to match the nets and the boxes. Discuss how the shapes and sizes of the faces on the solid help you decide.

1. Draw a line from each box to the correct net shape to show how it was made.





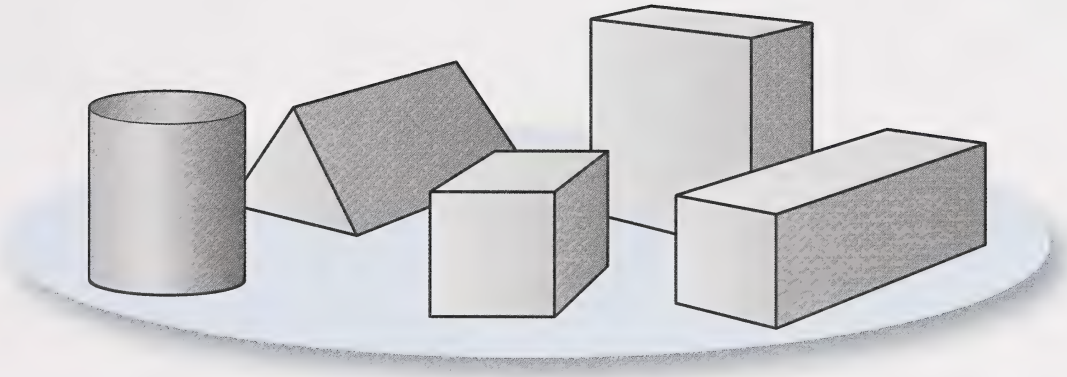




Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

Ask your Home Instructor to time you for 2 minutes. Write how many you completed.

Use the "Answer Key to the Self-Marking Activities" to check your work. Remember to record your number correct on the Math Facts Graph for Day 8 in the Appendix.



DAY 8

TIMED EXERCISE: 2 MINUTES

$3 \times 4 =$ _____ $2 \times 9 =$ _____ $6 \times 3 =$ _____ $0 \times 6 =$ _____ $2 \times 4 =$ _____ $6 \times 5 =$ _____ $7 \times 5 =$ _____

$4 \times 8 =$ _____ $2 \times 1 =$ _____ $7 \times 6 =$ _____ $5 \times 5 =$ _____ $8 \times 3 =$ _____ $3 \times 3 =$ _____

9×3	7×2	8×4	6×4	3×1	7×7
5×9	4×5	2×3	4×4	6×6	5×3

There is no assignment in the Assignment Booklet for Day 8.

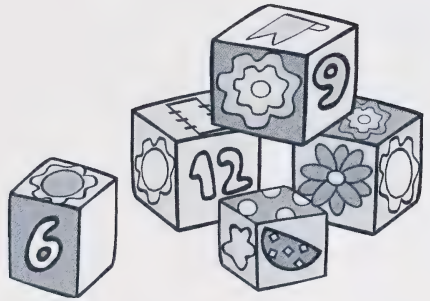
Number completed	
Number correct	

EXTENSION ACTIVITIES

Try to make more nets for cubes on your own.

or

Select a small box. Trace each face of the box onto a piece of paper. Cut out the faces. Tape them together to make a net. Test the net by folding it and taping it together. Does it form a model of your box?

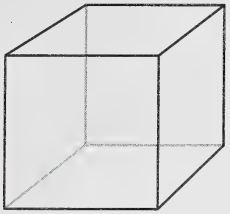


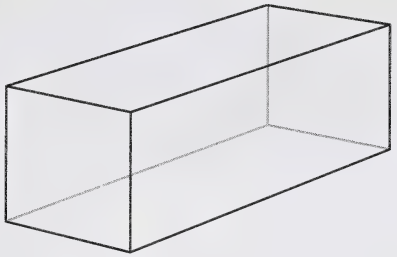
DAY 9: THIS IS WHAT I KNOW

So far you have studied many things about shapes and geometric solids. Today, get ready to show all that you have learned.

On what kinds of shapes are these students playing?

Look at the cube and the rectangular prism. Then answer the questions.





1. How are they alike? _____

_____

_____

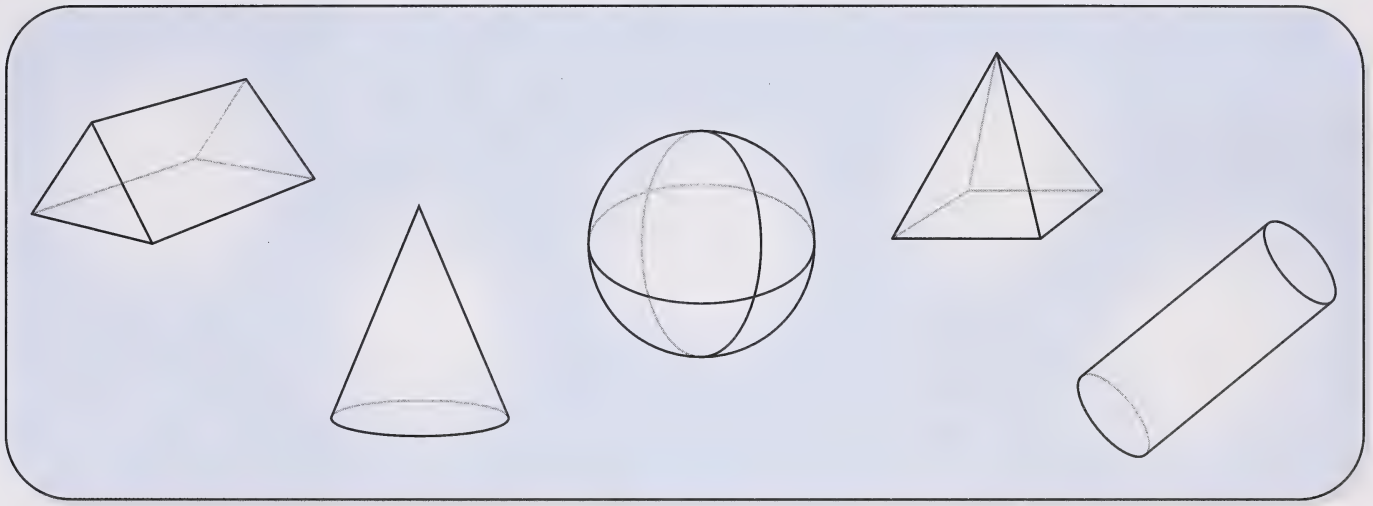
2. How are they different? _____

_____

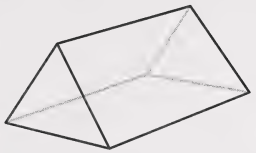
_____

Have the student write the answers on the lines. Then check them together in the "Answer Key to the Self-Marking Activities." Discuss the questions the student answered incorrectly and help the student make corrections.

3. Choose one of the following solids. Write the best description about it that you can.



4. Draw a line to match the geometric solid to the correct set of faces that make up that solid.



Check that the items the student chose are shaped like the solids in the columns. Pyramid shapes are often difficult to find, so perhaps you could look for pictures in books of pyramids or pyramid-shaped buildings. Some houses have pyramid-shaped roofs.

5. Look around your room. On the following chart, write or draw the things you can find that are shaped like the solids. You should now be able to quickly fill in this chart.

Spheres	Pyramids	Cubes	Rectangular Prisms	Cylinders

Take out some modelling clay and drinking straws.

6. Predict how many straws and balls of modelling clay you will need to build a pyramid.

   straws: _____ balls of clay: _____

   Now build a pyramid. Was your prediction correct?

   _____

Provide the student with straws and modelling clay.

7. Make 8 balls of clay and gather 12 straws. What type of solid can you build using all these materials?

   _____

Check the answers with the student by examining the models.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

For more work with geometric solids, try the National Council of Teachers of Mathematics website. At this site, you can select the grade level 3–5 and then click "i-Math Investigations."

- **http://illuminations.nctm.org**

Go to Assignment Booklet 8A. When you have finished today's assignment, complete the Student's Checklist and Student's Comments before submitting your work to your teacher.

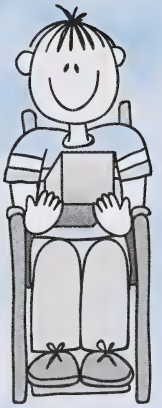
DAY 10: LOTS OF LINES

A simple line can follow many paths! In geometry, a line tells you many things. Today you'll find out what lines can tell you. You'll be looking at lots of lines!

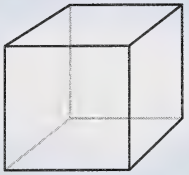
Your geometric solids will help you look at lines and learn new words to describe them.

LESSON 1

Take out your geometric solids.

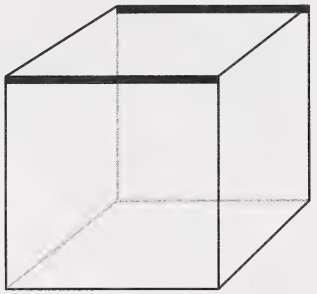


Place the cube in front of you.



Examine the cube. How many edges does it have? _____

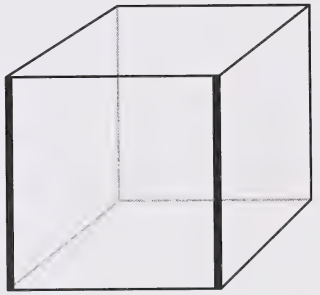
Look at the pair of opposite edges that are shown in bold on this cube.



Do the edges in bold meet? As you can see, the edges **do not** meet.

Check the answer with the student. The student should see that there are twelve edges. Your student may find it helpful to mark off each edge as it is counted. Use a removable sticky note or erasable pen to identify each counted edge.

Look at another pair of opposite edges shown in bold on the cube.

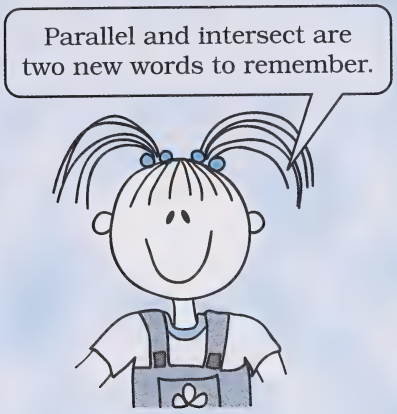


Do these opposite edges meet? These edges don't meet either. Look carefully at all the pairs of opposite edges on the cube. Do any of them meet?

None of the opposite edges on a cube meet. In geometry the word **parallel** describes edges or lines that never meet and are equal distance apart. The word to describe when lines meet is **intersect**.

Parallel describes lines that **never intersect** because they are the same distance apart. Show your home instructor all the parallel lines in the cube.

Now examine the rectangular prism.

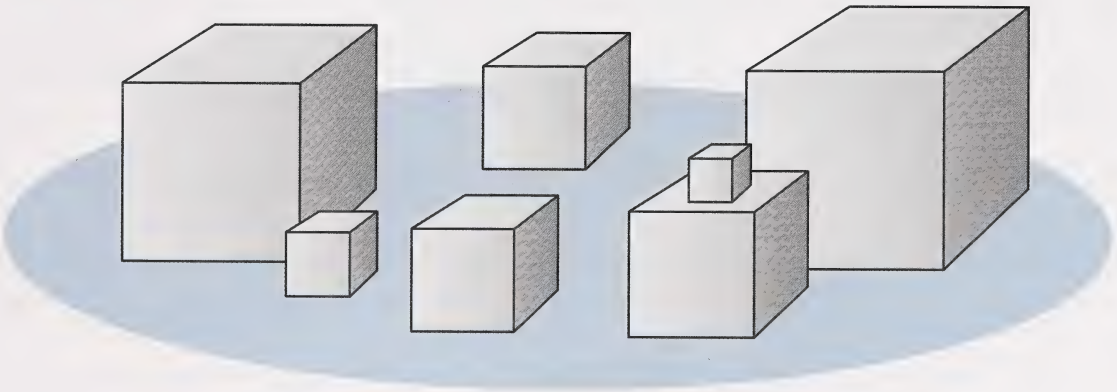


Do the opposite **edges** of a cube or a rectangular prism **intersect**? Explain your answer.

Discuss the terms *parallel* and *intersect* with your student.

Point out the opposite edges of the cube and rectangular prism. Ensure the student understands this concept that opposite lines, or edges, of a cube and a rectangular prism never intersect. They are parallel.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

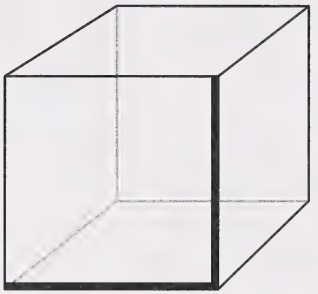


LESSON 2

Assist your student in examining and identifying the geometric lines that intersect.

Examine the cube again. You discovered that all the opposite edges are parallel, but you may have noticed that some edges do meet or intersect.

Look at this picture of a cube.

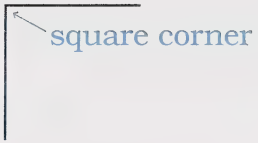


Elicit that some lines do meet or intersect.

Do the edges that are shown in bold meet?

Look at the corners or vertices where the edges or lines intersect. Draw one corner of the cube in the space below.

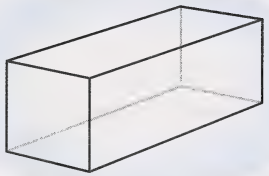
When lines meet or intersect they sometimes form a square corner that looks like this.



If you drew a corner like this, you were right!

In geometry the word that describes edges or lines that intersect and form a square corner is **perpendicular**.

Examine your rectangular prism carefully.



How many edges does it have? _____

Does the rectangular prism have parallel lines? Does it have perpendicular lines?

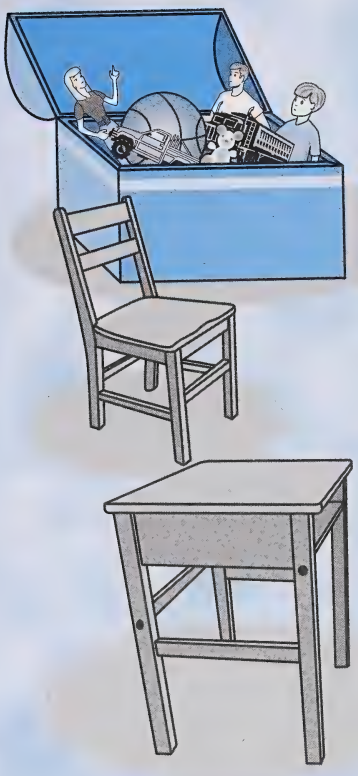
Yes, a rectangular prism has some parallel lines or edges and some perpendicular lines, too.

It has 12 edges. Direct the student to see that the lines and corners of the prism are parallel and square, just like the cube. The parallel lines do not intersect.

Discuss the term *perpendicular*. Lines that intersect (meet) and form a square corner are called perpendicular. Point out the lines that meet on the cube and rectangular prism. Ensure the student understands this concept.

DAY 10

Objects might include a toybox, a window, a door, a table, desk top, a book, or a calendar.



Look around your room. Find objects that have parallel and perpendicular lines.

Draw one of the objects in the box below.

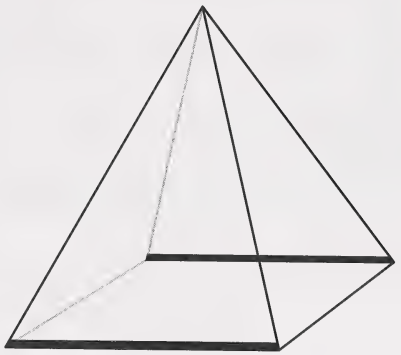
LESSON 3

Place the square-based pyramid in front of you.

Examine the square-based pyramid.

How many edges does it have? _____

Look at the edges that are shown in bold in this pyramid.



Do the two edges of the base that are shown in bold intersect? What are these lines called? _____

It is important that the student has the 3-D solid in front of him or her to be able to examine it carefully.

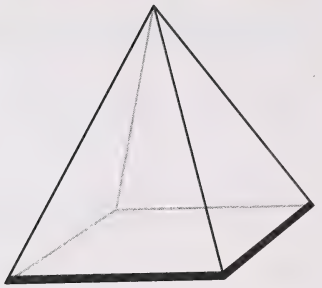
Check that the student understands there are eight edges.

If necessary, help the student see that the two edges do not intersect because they are parallel.

DAY 10

Help the student use the square-based pyramid to see that these lines intersect to form a square corner. They are called perpendicular.

Look at these edges that are shown in bold.

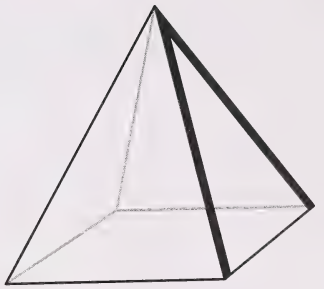


Do the two bolded edges in the base intersect? What are these lines called?

_____

Check the answers together. Yes, they intersect, but they are not perpendicular because they do not form a square corner. Only lines that meet and form a square corner are perpendicular. They are not parallel because they are not opposite each other or equal distance apart.

Look at these bolded edges of the pyramid.



Do these edges intersect? _____

These edges do intersect. They intersect or meet each other, at the point, or vertex.

1. Are these lines perpendicular? _____ Why or why not?

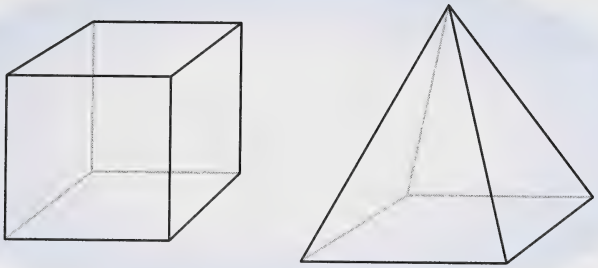
_____

_____

2. Are these lines parallel? _____ Why or why not?

_____

_____



Now compare the edges of the cube with the edges of the square-based pyramid. What can you say about them?

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

Go to Assignment Booklet 8B.

Have the student talk about the edges of both solids. Encourage the student to use the language of geometry when describing the solids. Elicit the cube has both parallel and perpendicular lines. The square-based pyramid has parallel lines, perpendicular lines, and lines that intersect but are not perpendicular (those at the point).

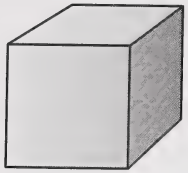
DAY 11: COMPARING AND CONTRASTING OBJECTS

Can you describe a window? How about a picture frame? How are they alike? How are they different?

You'll look for differences and similarities between 3-D objects today.

LESSON 1

1. Look at the pictures of the geometric solids. Write the name of each solid on the line below it.

a. 

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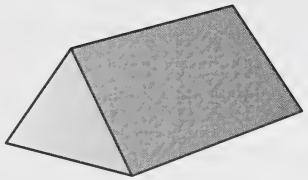
b. 

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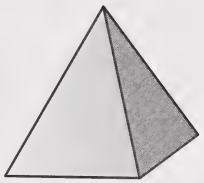
c. 

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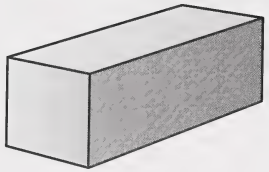
d. 

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e. 

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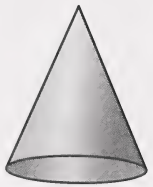
f. 

_____

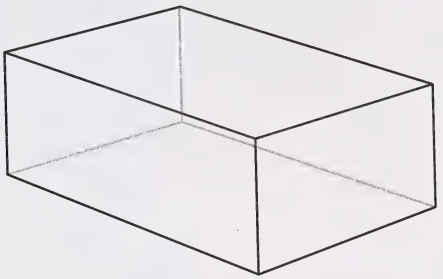
Check the answers with your student. Placing a cube, a triangular prism, a square-based pyramid, a rectangular prism, a cylinder, and a cone in front of the student may help.

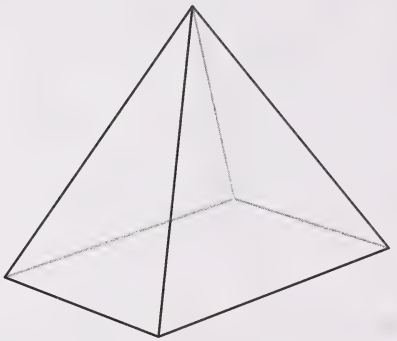
Take out your geometric solids.

Place the rectangular prism with all rectangular faces and the rectangular-based pyramid in front of you.

Discuss the terms *compare* and *contrast*. Ensure the student understands what they mean.

You are going to **compare** and **contrast** these two solids. Usually compare means to look for both similarities and differences. When you compare and contrast two things, compare means to look for similarities or how things are alike. Contrast means to look for differences or how things are not alike.





There are ways that these two solids are the same. There are also ways that they are different. That is what compare and contrast asks you to do—to look for similarities and differences between two objects.

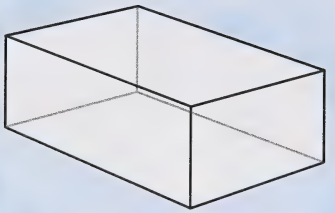
2. **Compare** the rectangular prism with the rectangular-based pyramid for similarities. Write three **similarities** on the following lines.

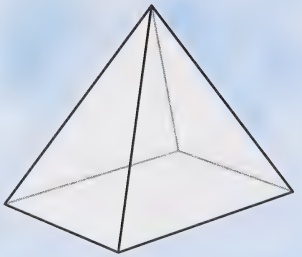
- _____
  _____
- _____
  _____
- _____
  _____

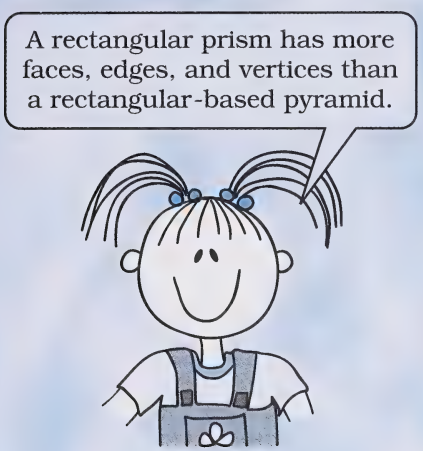
3. **Contrast** the rectangular prism with the rectangular-based pyramid for differences. Write three **differences** on the following lines.

- _____
  _____
- _____
  _____
- _____
  _____

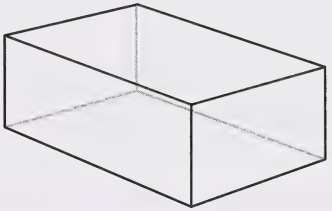
Allow the student time to find as many similarities and differences as possible. Discuss the answers in the "Answer Key to the Self-Marking Activities" with the student when questions 2 through 6 are answered.

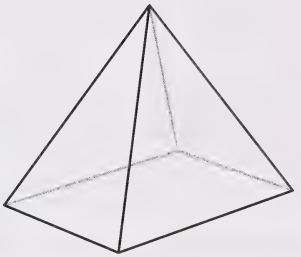






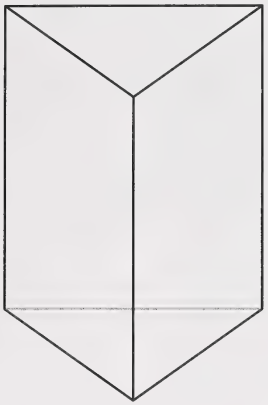
4. Examine the two solids again. Then fill in the chart with the correct numbers.

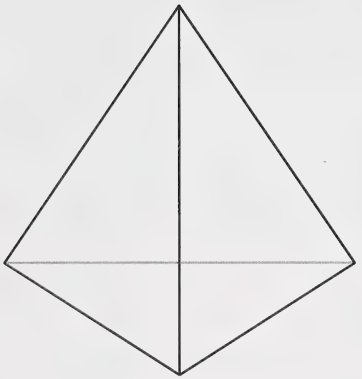




How Many?	Rectangular Prism	Rectangular-Based Pyramid
Faces		
Edges		
Vertices		

Place a triangular prism and a triangular-based pyramid in front of you. What will you do to compare and contrast them? Find as many similarities and differences as you can between the two solids.

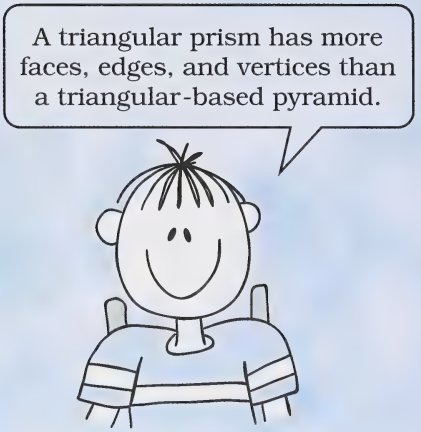




5. Examine the two solids again and then fill in the chart.

How Many?	Triangular Prism	Triangular-Based Pyramid
Faces		
Edges		
Vertices		

Have the student answer orally. Look for ways they are the same and ways they are different. Encourage the student to use geometric words when comparing and contrasting the solids. Use words such as parallel, perpendicular, intersecting, vertices, and so on.



6. What is the main difference between a prism and pyramid with the same base shape?

_____

_____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITY

As before, have the student use words of geometry when comparing and contrasting the objects. Encourage the student to find different objects to compare, such as a toilet and sink, a glass and a pitcher, a rug and a picture, and so on. Continue to encourage the student to use geometric words.

You've been comparing and contrasting geometric solids. Now compare and contrast 3-D objects, for example, a table and a door.

Use as many geometric words and ideas as you can think of to describe a table. How is the table like a door? How is it different?

Find other objects in and around your home that are similar. Compare and contrast them.

Are you ready for your timed exercise? Ask your home instructor to time you for 2 minutes. Write how many you completed.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work. Remember to record the number correct on your Math Facts Graph for Day 11 in the Appendix.

DAY 11

TIMED EXERCISE: 2 MINUTES

$6 \times 2 =$ _____ $2 \times 7 =$ _____ $6 \times 6 =$ _____ $0 \times 8 =$ _____ $9 \times 4 =$ _____ $3 \times 6 =$ _____ $7 \times 5 =$ _____

$5 \times 5 =$ _____ $8 \times 1 =$ _____ $7 \times 7 =$ _____ $2 \times 5 =$ _____ $4 \times 7 =$ _____ $2 \times 1 =$ _____

9×3	6×5	8×2	3×4	3×3	0×1
3×8	4×6	7×3	5×4	6×7	3×5

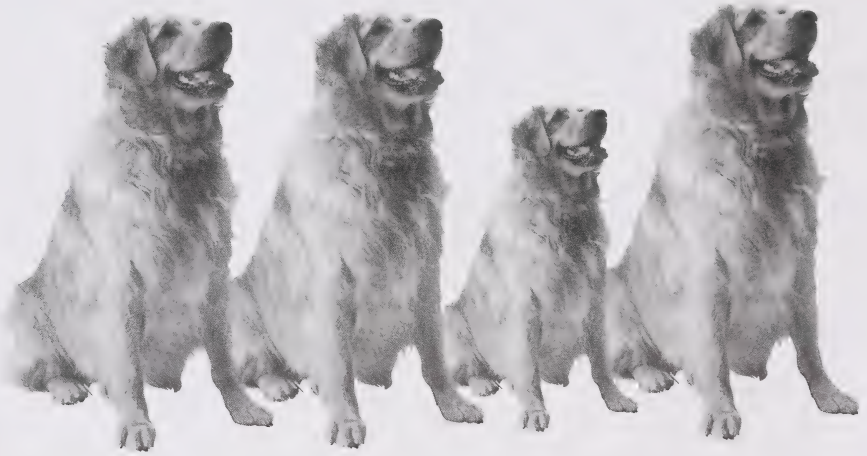
Go to Assignment Booklet 8B.

Number completed	
Number correct	

DAY 12: ARE THEY CONGRUENT?

Some shapes and objects are exactly alike. You're going to learn how to identify them and prove they really are identical.

LESSON 1



Look at these four dogs. One of them is not like the others. Which one? How is it different from the others?

Have the student answer orally that the third dog is smaller than the others but that the other dogs are the same.

Look at the other three dogs. Are they the same? The other three dogs are **congruent**. The little dog is similar to the three dogs, but it is not congruent. Do you remember this word? What do you think congruent means?

Have the student discuss what congruent could mean. Elicit it means identical.

Congruent means exactly alike or identical in shape and size. When two objects or shapes are congruent, they are exactly the same.

You know the smaller dog is not congruent, but it is similar to the other three dogs. How is it similar?

Have the student answer orally that the dog is similar because it has the same shape. Explain that similar means alike in some way but not exactly congruent.

Look at these shapes:

Are they congruent? How do you know?

Have the student answer orally. Help the student see that the triangles are congruent because they are all identical.

Are these stars congruent?

Which one is not congruent? If it is not congruent, how would you describe it?

The stars are not congruent. They are not all identical. The second star is not congruent, but it is similar.

Brainstorm with your student ways of checking congruency. Tracing, placing one shape over the other one, or measuring sizes with a ruler may be suggestions.

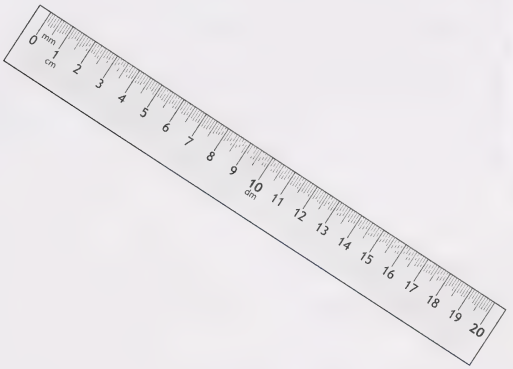
LESSON 2

There are ways to check if 2-D shapes and 3-D objects are congruent. Can you think of any?

One way is to place one shape or object on top of the other. You can then see if they are identical.

Another way is to trace the shapes or objects onto paper and compare the tracings.

A third way is to measure the shapes or objects with a ruler.



Look at the two boxes your home instructor has given you. Are they congruent? What methods can you use to prove they are congruent?

- _____

  _____

- _____

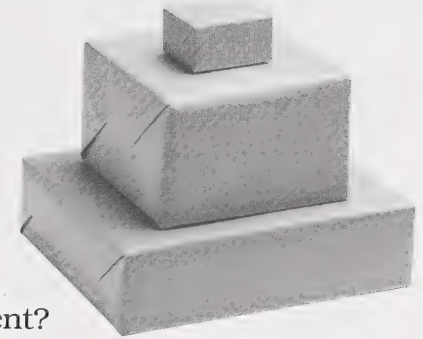
  _____

- _____

  _____

Provide the student with two identical boxes, such as boxes from toothpaste, jelly powder, tissue, crackers, or cereal. If you do not have two identical boxes, make two rectangular prisms from the nets in the Appendix.

Prove your two boxes are congruent using your methods.



Help the student to prove the boxes are congruent. Guide the student through the three methods.

Can you prove the boxes at the right are congruent?

DAY 12

Help the student prove the shapes and objects are or are not congruent. Discuss why they are or are not congruent.

Look around your room and home. Find two objects and two shapes that look congruent.

Prove that they are or aren't congruent. If they aren't congruent, explain why.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

Go to Assignment Booklet 8B.

DAY 13: WHAT DIRECTION IS THAT?

Have you ever wondered how explorers found their way around the world? How do people find their way in a new city?

If your family was planning to go camping in the back country, what could you use to help you find the lake where you want to fish?

You'll find the answers to these and other questions today.

LESSON 1

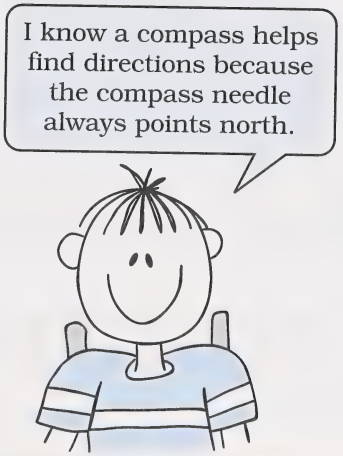
Sarah's mother was on the telephone giving directions. Sarah heard her mother say, "Turn north when you get to Highway 44. Drive six kilometres until you get to the stop sign. Then turn west and drive for two kilometres. You'll see our house at the top of the hill."

Sarah wondered how that person would know where north and west were. Directions had always been confusing to her. She asked her mother to explain them.

Her mother told her that thousands of years ago people learned to use many guiding points to help them find their way. They noticed that some stars always shone more brightly than others and that they were always found in the same direction. These certain guiding stars became helpful to travellers and were referred to by names so others would know the direction, too. (In Canada, one of our guiding stars is known as the North Star and that direction is called **north**. The opposite direction is called **south**.)

People also observed that the Sun always rose in the same direction—and set in the opposite direction. The direction that the Sun rises we know as **east** and the direction the Sun sets we call **west**. These guiding points have made travelling much easier since early times.

Explorers, sailors, and travellers of all kinds have depended on the stars at night and the Sun by day to find their way to near and faraway places. The words north, east, south, and west help explain directions more easily to others.



DAY 13

Have the student elicit north, east, south, west.

Name the four directions.

_____ _____

_____ _____

When anyone faces the North Pole, they are facing **north**. That is why the North Pole is used as a reference point for anyone, anywhere in the world.

Take out four index cards or pieces of paper.

On each card, write one of the directions. Your home instructor will place the north card on the north wall or on an object that is in the north part of the room.

Tell the student that you know where north is and tape the north card on the north wall in the room.

Where will the south card go? Tell your home instructor.

Have the student answer the questions orally. Elicit south is opposite north. Tape the card on the opposite wall (or an object in that direction). Point out where the Sun rose. Elicit the Sun rises in the east. Tape the east card on an object in that direction. Elicit the opposite direction of east is west. Tape the west card on an object in that direction. Leave the cards in place for the next few days.

Do you know in which direction the Sun rose this morning? What direction is that? The Sun rises in the east and it sets in the opposite direction. What direction is that?

Are you ready for some fun with directions? Your home instructor will read some directions to you. Start in the middle of the room. Follow the instructions, and see how well you are able to follow the directions.

- Face north.
- Take 2 steps north.
- Take 3 steps east.
- Take 1 step south.
- Take 4 steps west.
- Face south.
- Point east.
- Point south.
- Point north.

Watch to see how well the student understands directions.

How well did you do? It's your turn to read the directions while your home instructor follows them. Make sure your home instructor is following them correctly.

Have the student read the directions for you to follow.

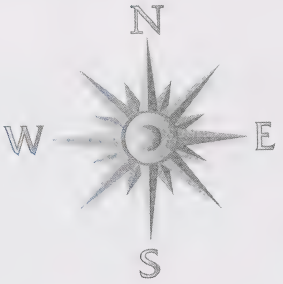
Choose three objects in the room. Then tell your home instructor whether they are north, east, south, or west of you. Look at the cards on the walls to help you.

Check that the student correctly identifies the objects in the room as north, east, south, or west of him or her.

LESSON 2

If possible, have all three available.

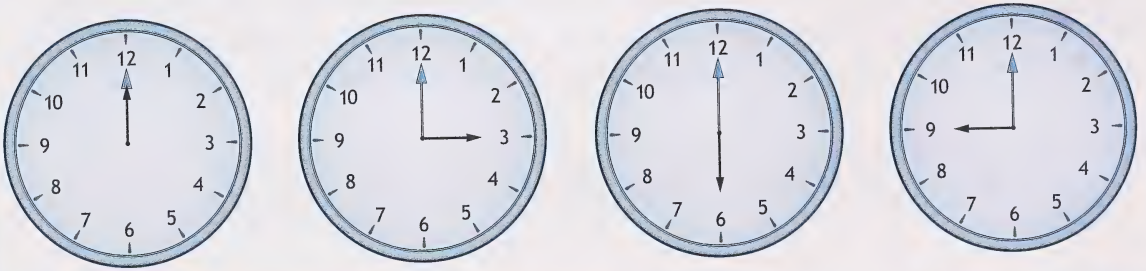
Look at a globe, an atlas, and a map. Find out how directions are indicated on them.



Explain that most maps and globes use a *compass rose* to indicate directions. Discuss the findings with the student.

Look for the **compass rose** on your map or globe. A compass rose is a symbol like the one above. It shows the directions on a map. What direction is pointing up? If you said north, you're right. On a map, north is usually shown pointing up. South will always be opposite, or pointing down. West is on the left, and east is on the right.

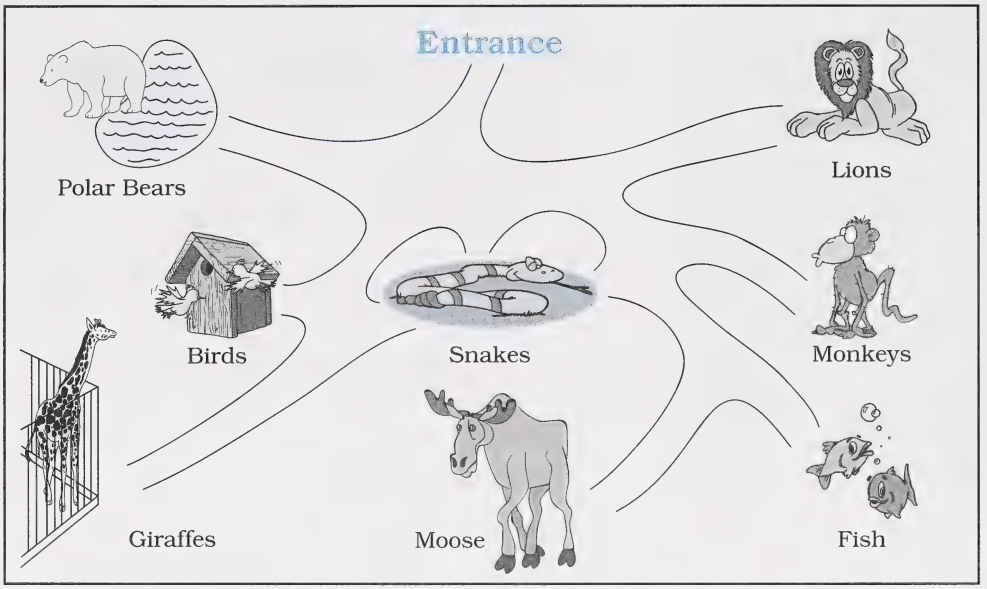
Think of numbers on a clock to help you remember directions. The 12 will remind you of north, the 3 of east, the 6 of south, and the 9 of west.



A fun way to remember where the directions are is to say the phrase **N**ever **E**at **S**hredded **W**heat. The first letter of each word stands for a direction.

LESSON 3

1. The map shows where some animals in the Metro Zoo are found. Indicate the directions by writing **North**, **East**, **South**, and **West** on the lines outside the map.



2. Choose the correct direction word (**north**, **east**, **south**, or **west**) to complete each of the following sentences:

   a. The polar bears are _____ of the giraffes.

   b. The monkeys are _____ of the lions.

   c. The snakes are _____ of the birds.

   d. The moose are _____ of the fish.

3. Are the birds or the fish farther south?

   _____

4. Are the giraffes or the moose farther east?

   _____

5. Are the monkeys or the lions farther north?

   _____

6. Are the snakes or the polar bears farther west?

   _____

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

EXTENSION ACTIVITIES

On a blank piece of paper, draw your own map. It can be either a real place you know or a place you make up. Label your map with a compass rose or a direction on each side.

Below your map or on a separate piece of lined paper, write some direction questions for your home instructor, a friend, or your teacher to answer. Some questions could be fill-in-the blank with a direction and some could be questions that require a place on the map for an answer. Use the questions about the Metro Zoo as examples for your questions.

When you have your questions written, check them over to make sure you know the answers. Then have your home instructor, a friend, or your teacher fill in the answers for you to check.

or

Use a real map to find places. You and a friend or your home instuctor could ask each other directions questions about the places you found.

There is no assignment in the Assignment Booklet for Day 13.

DAY 14: TAKING THE BEST PATH

Have you ever worked on a maze, or even been in one? Sometimes it's easy to figure out the best path to take. Sometimes it's difficult.

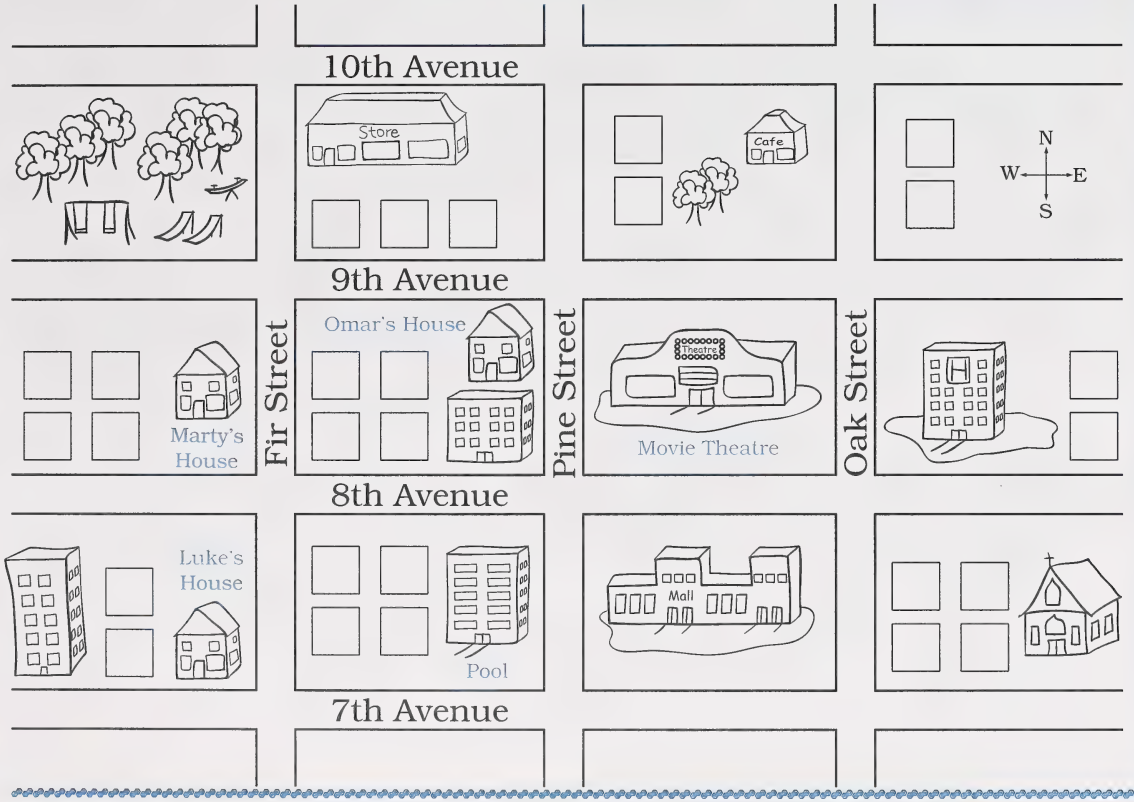
What path do you take to your friend's house? Is it the best way to go?

You're going to follow directions today to travel along paths.

LESSON 1

It's fun to trace a path or to figure out a maze! Are you ready? You will need a green pencil crayon to trace the path. Your instructor will read the directions while you trace them on the map of Luke's Community. Listen carefully.

Luke's Community



A different colour pencil crayon may be substituted.

Read the following directions for the first path:

1. Start at Luke's house.
2. Go north on Fir Street until you get to 9th Avenue.
3. Head east and stop just before Pine Street.
4. Place an ✗ on the house on the south side of the street.

Check the path with the student. Have the student answer the questions orally. He or she should have ended up at Omar's house.

Read the following directions for the second path:

1. Start at Marty's house.
2. Go north on Fir Street until you get to 10th Avenue.
3. Turn east and go until you get to Oak Street.
4. Place an ✗ on the building that is on the south side of the Avenue.
5. Now go south on Oak Street and continue past 8th Avenue.
6. Turn west on 7th Avenue and stop just past Pine Street. Mark an ✗ on the building to the north.

Check the path together with the student. Have the student answer the questions orally. The ✗'s are the Cafe and the Pool.

For extra practice, you could make up a different path, and have the student trace it using a different colour.

If the student has difficulty tracing the paths, try a shorter set of directions.

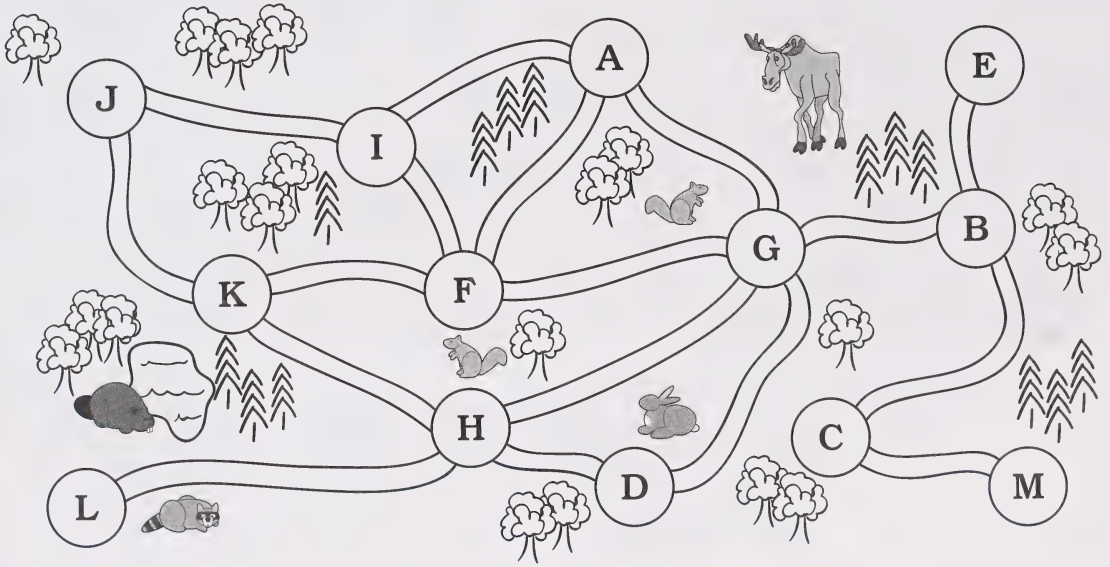
Where did you end up? If you placed an ✗ on Omar's house, you did well.

Now try another path. This time, trace the path with a red pencil crayon.

What two buildings did you place ✗'s on?

LESSON 2

There is a nature trail in the park near Luke's house. There are different kinds of paths. Read the following directions and trace the paths on the trail.



1. With a purple crayon, trace two different paths from A to K without going through F.

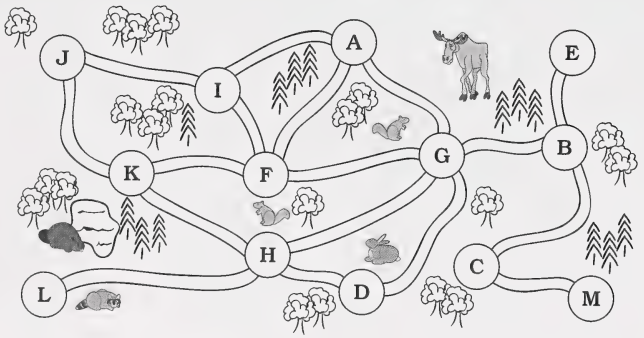
2. With an orange crayon, trace a path from E to L, making sure to go through D.

3. With a green crayon, trace this path: J to I, I to F, F to G, G to B, B to C, C to M.

4. With a blue crayon, trace the shortest path from L to B.

Are you ready for your timed exercise? Ask your home instructor to time you for 2 minutes. Write how many you completed.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work. Write the number correct and complete the Math Facts Graph in the Appendix.



There are no answers given in the Self-Marking Answer Key.

Check that the paths are accurately coloured and follow the given directions.

TIMED EXERCISE: 2 MINUTES

$6 \times 2 =$ _____ $3 \times 7 =$ _____ $6 \times 6 =$ _____ $1 \times 9 =$ _____ $5 \times 4 =$ _____ $2 \times 9 =$ _____ $6 \times 8 =$ _____

$9 \times 5 =$ _____ $9 \times 3 =$ _____ $7 \times 7 =$ _____ $7 \times 6 =$ _____ $5 \times 7 =$ _____ $6 \times 4 =$ _____

7×5	6×3	8×1	0×4	2×2	1×1
4×8	4×2	5×3	7×4	3×7	4×4

Go to Assignment Booklet 8B.

Number completed	
Number correct	

DAY 15: NUMBER LINES

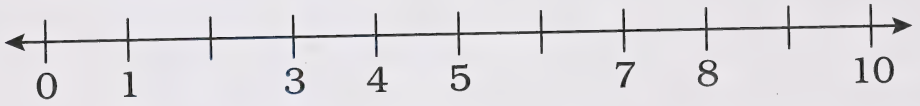
Marty's home is really busy this morning. His dad is pouring water into the coffeemaker. His older brother is looking for a measuring cup as he is making muffins. His mom is using a tape measure to measure the kitchen window, because she wants to buy new curtains today. Grandpa comes into the kitchen and says, "The temperature is 10 degrees."

What do all these activities have in common? If you said they are all using tools to measure things, you were right. Those measurement tools all have number lines.

You're going to learn about number lines today. You will get a chance to graph the numbers yourself!

LESSON 1

This line has a special name. It's a line that has smaller lines spaced out equally on it with numbers. Can you think what this line might be called?

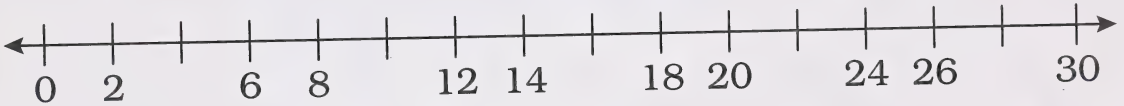


It's called a **number line**. A number line is a line that has smaller numbered lines equally spaced along it. There are some numbers missing. What are they?

_____ _____ _____

How did you know which numbers are missing?

Look at this number line. What numbers are missing? How do you know?



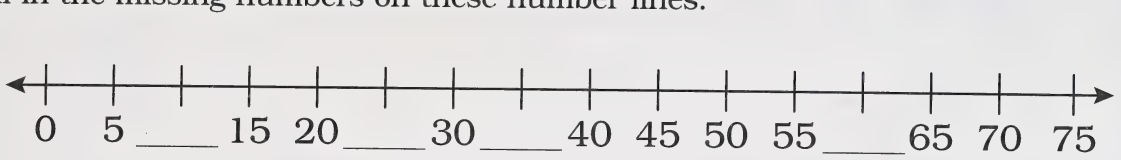
_____ _____ _____ _____ _____

What is a way to draw another number line?

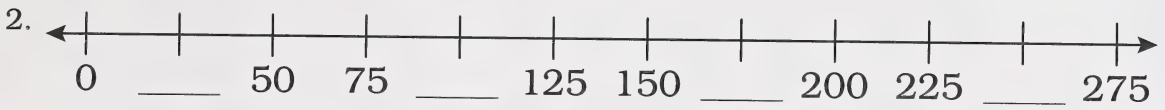
Check the answer together with the student. Discuss the missing numbers of 2, 6, and 9. The numbers show a pattern of counting by ones, so the missing numbers must come between the two numbers on either side of the missing number and reflect the counting pattern.

Check the answer together with the student. The missing numbers are 4, 10, 16, 22, and 28. Discuss the missing numbers. The numbers are counting by 2s, so the missing numbers must come between the two numbers on either side of the missing number and reflect the counting pattern. Brainstorm other number lines: counting by 3s, 4s, 5s, 10s, 25s, 100s, and so on.

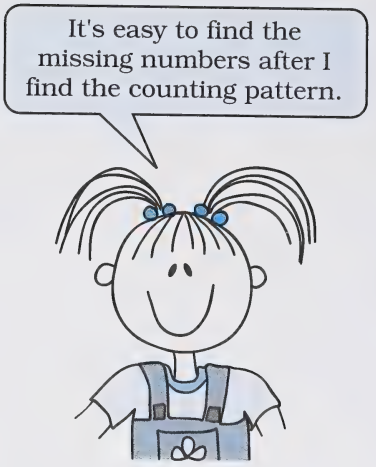
Fill in the missing numbers on these number lines.



The numbers show a pattern of counting by _____



The numbers show a pattern of counting by _____



Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

LESSON 2

Have the student answer the questions orally.

Number lines are used in many ways. One way is to measure something.

What tool that has a number line do you use to measure? _____

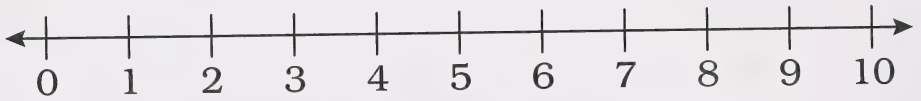
The student may have suggested a ruler.

What does a ruler measure? Tell your home instructor.

It can measure length, width, height, and depth.

A number line can show addition and subtraction. You already know how to do that. Show how to add 5 + 3 on this number line.

Review how to add on a number line. Start at 5 and go 3 steps to the right. What number are you at? (8)



Now show how to subtract 7 – 4 on the number line.

Review how to subtract on a number line. Start at 7 and go 4 steps to the left. What number are you at? (3)

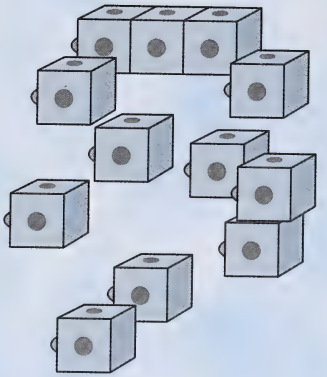
Number lines can also be used for graphing.

Take out your pattern blocks or interlocking cubes and a ruler.

You are going to make your own number line for graphing. You will use the line below and the following instructions:

- Use the ruler to draw smaller lines 1 cm apart on the number line.
- Number these lines from 0 to 15.
- Place 8 red cubes, 8 blue cubes, and 8 yellow cubes on your desk.
- Mix them up. Without looking, grab a handful of cubes.
- Look at the cubes you grabbed. Count the number of red cubes.
- Graph that number on the number line by circling the number in red.
- Grab a second handful of cubes. Count the number of blue cubes.
- Graph that number on the number line by circling the number in blue.
- Grab a third handful of cubes. Count the number of yellow cubes.
- Graph that number on the number line by circling the number in yellow.

Did you pick the most red, blue, or yellow cubes? What colour of cube did you pick least?



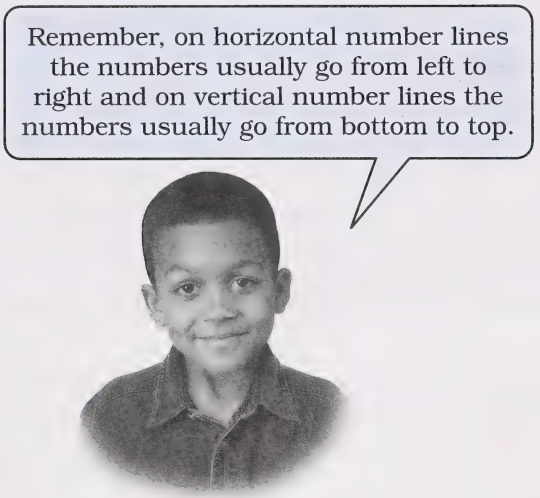
Check the number line to ensure the student correctly graphed the results.

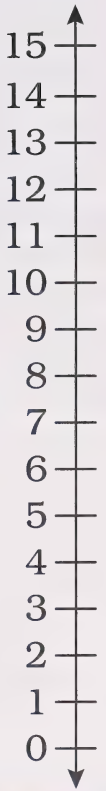
Have the student answer orally.

Review the terms *horizontal* (lines that go across) and *vertical* (lines that go up and down).

LESSON 3

Many number lines are **horizontal**. The number lines you have worked with so far today are horizontal. That means they go across usually from left to right. Number lines can also be **vertical**. That means they go up and down usually from bottom to top.





Where have you seen a vertical number line like the one shown on the previous page?

An example of a vertical number line is a thermometer.

A thermometer uses a vertical number line.

A vertical number line works exactly like a horizontal one. It can be labelled with numbers that count by 1s, 2s, 5s, 10s, and 25s. You can use a vertical number line to show addition and subtraction.

Using the vertical number line, solve this addition sentence:

$6 + 5 =$ _____

Check that the student is using the number line correctly when adding and subtracting. The answers are 11 and 4.

Solve this subtraction sentence using the vertical number line:

$13 - 9 =$ _____

If the number line is a thermometer and the temperature is 8 degrees, where would that be on the number line? Circle the temperature green.

Check that the student has circled 8 on the number line. Give the student a few more temperatures to circle on the number line.

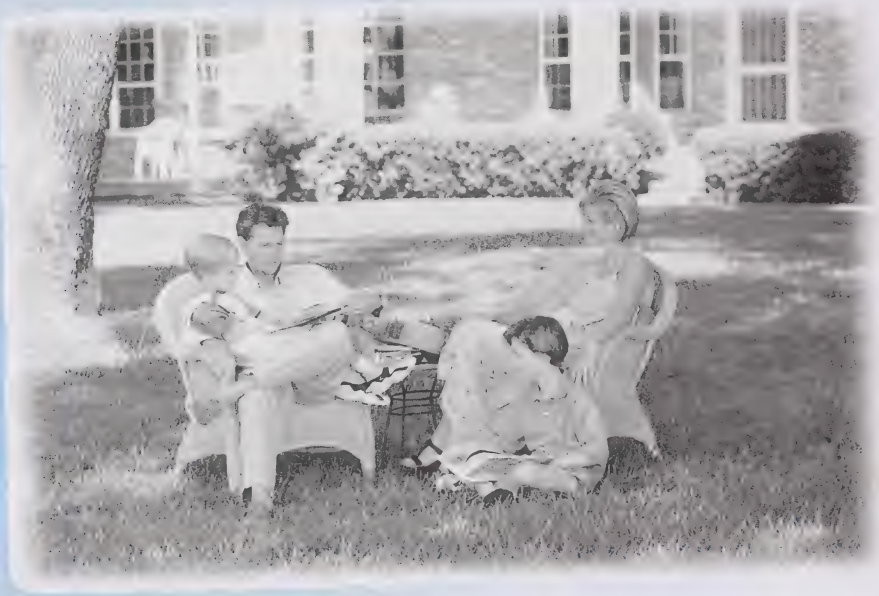
Go to Assignment Booklet 8B.

DAY 16: READING TEMPERATURE

A thermometer shows temperature. Do you know what the temperature is today? Are you able to find out? You could listen to the weather report or you could read a thermometer by yourself.

Maybe you will be a meteorologist someday! A meteorologist is trained in the science of the conditions that tell about weather.

Can you do your work outside today?



LESSON 1

Sarah was playing outside with her friends. They were all getting very warm. Sarah wondered what the temperature was. Her friend Beth said she thought it was about 20 degrees Celsius. They decided to find out.

How could Sarah and her friends find out what the temperature was?

Did you remember that a thermometer would be useful?

Have the student answer orally. The student could look at a thermometer and review what a thermometer does: it measures the temperature in units called degrees.

Sarah and her friends looked at the thermometer attached to the side of her house. It read 22° Celsius. Beth's estimation of the temperature was pretty accurate!

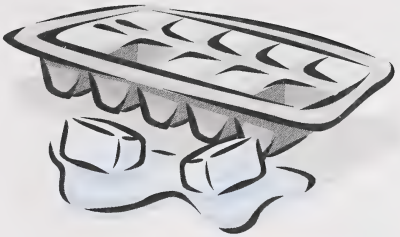
Find the thermometer in the Appendix. Do you remember how a thermometer works?

A thermometer measures temperature in standard units called **degrees** (°) **Celsius** (C). Temperature is measured as being above zero or below zero. A minus sign tells you it is below zero.

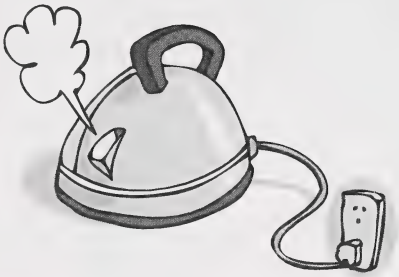
For example, 1°C is read as one degree Celsius or one degree above zero Celsius, and –1°C is read as minus one degree Celsius or one degree below zero.

Assemble the thermometer with the student. Have the student share what he or she knows about thermometers. Using the thermometer from the Appendix, review how it works and go over the ideas stated.

Look carefully at the number line on the thermometer. The black lines indicate intervals of degrees. Can you tell where the number line changes from above zero to below zero? Remember the level of the liquid (the red ribbon on the thermometer you are using) indicates the temperature.



Water freezes at 0°C.



Water boils at 100°C.

LESSON 2

Watch your home instructor demonstrate how to read different temperatures on the thermometer. A thermometer is a vertical number line.

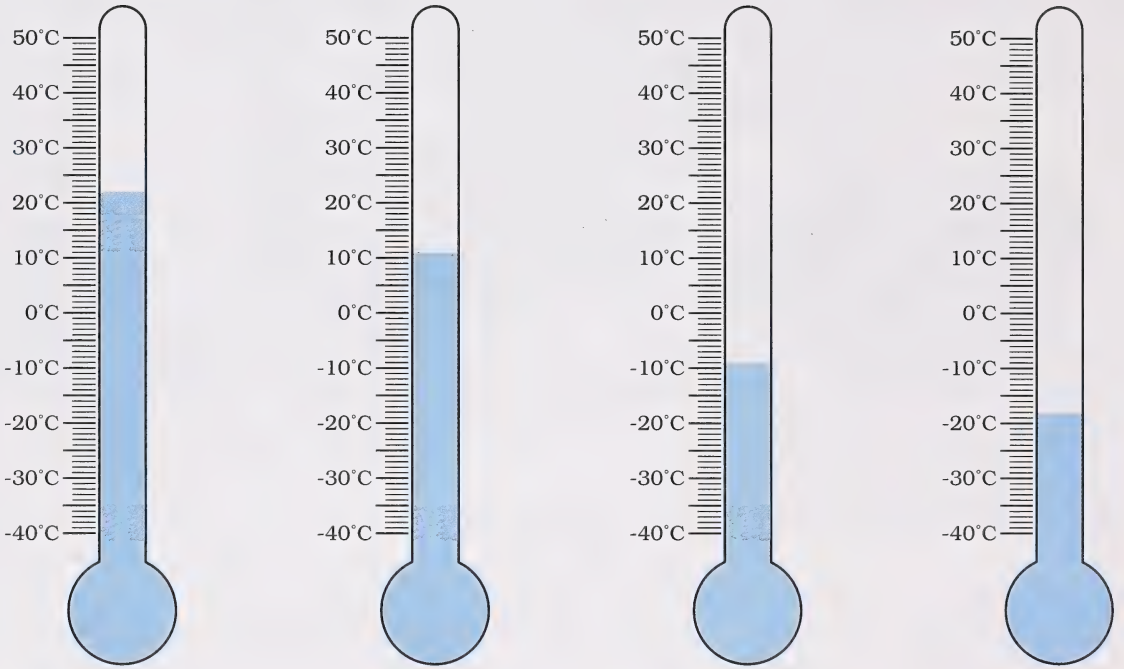
On the thermometer from the Appendix, show how to read temperatures.

It's your turn to show what you know. On the thermometer, use the ribbon to show the following degrees. Say them aloud and show your home instructor.

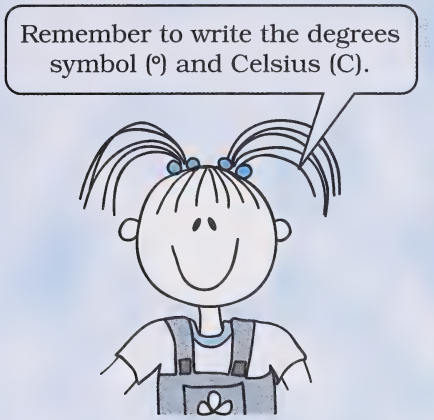
Have the student manipulate the ribbon to indicate the degrees on the thermometer. Check for accuracy.

15°C 32°C –25°C 0°C –40°C 50°C

Look at each of the following thermometers. On the line below, write the temperature indicated on each thermometer.



1. _____ 2. _____ 3. _____ 4. _____



Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work.

PLAY TEMPERATURE BINGO

Find and cut out the Temperature Bingo Cards in the Appendix.

You will need beans, coloured cubes, or pennies to mark your Bingo card. As your home instructor shows the temperature on the thermometer and calls it aloud, place a marker on the square of your card that shows that temperature. Your home instructor will play a Temperature Bingo Card, too. The first person to get a straight line wins!

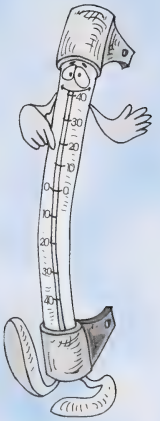
EXTENSION ACTIVITIES

1. Research the high and low temperatures in your community last year.

2. Draw a thermometer on a separate sheet of paper. Label the degrees and show the current temperature.

There is no assignment in the Assignment Booklet for Day 16.

Assist your student in cutting out both Bingo cards from the Appendix. Using the red and white ribbon, show the following temperatures in any order on the thermometer: 19°C, 42°C, –7°C, –34°C, 0°C, –12°C, 33°C, 16°C, 35°C, 15°C, 8°C, –17°C, 13°C, 20°C, –2°C, 4°C, 18°C, –22°C, –9°C, 3°C, 25°C, 2°C, 40°C, –10°C, –15°C, –33°C, –25°C, 45°C, 17°C, 50°C, 34°C, –20°C, 27°C, 30°C, –5°C, 28°C. Use the second card to play along with the student. Play until one person gets a straight line. Check that the student is correctly marking the card. Have your student take a turn at showing and calling out the various temperatures listed here for a second game. It is a good idea to cross out the numbers as they are called.



DAY 17: DIFFERENT TEMPERATURES

Does temperature make a difference?

Have you ever been too hot or too cold? If you want to feel comfortable in your home, what temperature should it be?

What temperature should it be if you want to play outdoors? What temperature is suitable to go skiing in the mountains or swimming at the lake?

You'll find out more about temperature today.

LESSON 1

Take out the thermometer.

What do you think the temperature in your home is right now?

_____° Celsius

Look at the thermometer. How is temperature measured?

_____

Degrees Celsius are standard units that are used for measuring temperature.

What does the thermometer read?

_____° Celsius

Was your estimate close?

Room temperature is usually about 20°C. It may be a few degrees higher or lower, but a comfortable temperature is about 20°C.

Accept the answer the student gives. This will be discussed later in the lesson.

Provide the student with a thermometer. If the thermometer has scales for Fahrenheit and Celsius, explain that it is the Celsius side that will be read. Check the answer together with the student in degrees Celsius.

How does the temperature outside compare with the temperature inside a building?

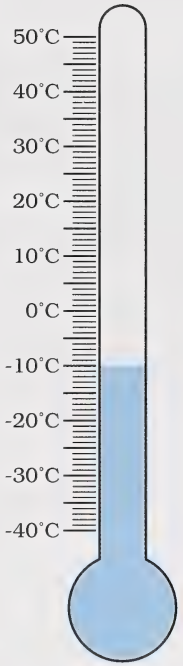
Discuss how the picture of Sarah indoors compares with the outdoor picture of Luke. Sarah would notice a difference in temperature and feel colder if she left the room to join Luke outside.

Luke went outside. He noticed a difference in temperature right away. He felt much colder than he did inside his home.

What does that tell you about the temperature outside? On this day, would a thermometer outside measure a higher or lower temperature than inside Luke's home?

Have the student answer orally. The temperature is colder outside, so the thermometer would measure a lower temperature.

The temperature outside was lower than it was inside. Luke looked at the thermometer attached to the outside of his home. It read –10°C.



Luke guessed the temperature was below zero when he looked outside. How would he know that? What are some signs that the temperature might be below zero?

Discuss the signs of below-zero weather, such as snow, frost, bare trees, or ice. You may also think of people seeing their breath or people and animals wearing warm coats, and so on.

Sarah and her friend Unni were playing a game on the computer at Unni's house. The girls wanted to go outside and play.

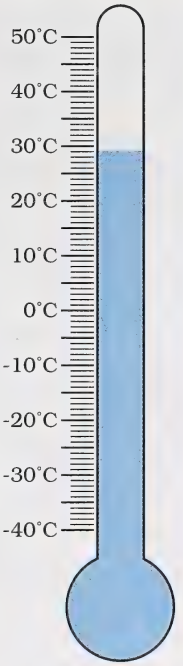
When they looked outside, they saw Unni's little brother wearing his bathing suit and splashing water on himself. Do you think the temperature is below zero?

If Sarah and Unni went outside, what would they notice? How would they feel?

The girls did go outside. They noticed a difference in temperature right away. They felt much warmer outside. In fact, they felt hot.

Discuss how room temperature compares to the outdoors and how Sarah and Unni would notice warmer temperatures outside.

Unni looked at the thermometer attached to the outside of her house. It read 29°C like the thermometer shown here. Does the thermometer measure a higher or lower temperature than the normal room temperature?



Have the student answer orally. Discuss that the temperature is warmer, so the thermometer would measure a higher temperature than the normal 20°C room temperature.

The temperature outside is higher than it is inside.

LESSON 2

Read the following temperatures aloud. Talk to your home instructor about what each of them means.

Discuss the meaning of each temperature.

0°C	(zero degrees Celsius)	– water freezes
100°C	(100 degrees Celsius)	– water boils
37°C	(37 degrees Celsius)	– body temperature (approximate)
20°C	(20 degrees Celsius)	– room temperature (approximate)

DAY 17

Have the student test the places in the following order: freezer, fridge, bedroom, outside, tap water, body, and hot tea.

Note: Help the student prepare the hot cup of tea and the cup of warm tap water. Advise the student to take special care when working with the hot water.

Also check the thermometer you are using to be sure the scale goes to 100°C for the hot tea. If the scale only goes to 50°C, do not immerse it in hot tea. Discuss why.

When measuring body temperature, you could place the thermometer under the armpit for a few minutes.

Estimate the temperature of each place in degrees Celsius. After you write your estimates, measure the temperature. Let the thermometer sit in each place for several minutes.

Places	Estimate °C	Actual °C
freezer (inside)		
fridge (inside)		
bedroom		
outside		
cup of warm tap water		
my body		
cup of hot tea		

Use the "Answer Key to Self-Marking Activities" in the Appendix to check your work.

How close were your estimates to the actual temperatures? Were you surprised by any of them? Now you know how temperature makes a difference.

Are you ready for your timed exercise? Do as many questions as you can in 2 minutes. Write how many you completed.

Discuss the results of the experiment with the student.

Use the "Answer Key to the Self-Marking Activities" in the Appendix to check your work. Write how many were correct and complete the Math Facts Graph.

TIMED EXERCISE: 2 MINUTES

$7 \times 2 =$ _____ $5 \times 7 =$ _____ $4 \times 6 =$ _____ $9 \times 3 =$ _____ $5 \times 8 =$ _____ $2 \times 8 =$ _____ $8 \times 4 =$ _____

$6 \times 6 =$ _____ $5 \times 3 =$ _____ $6 \times 7 =$ _____ $7 \times 7 =$ _____ $5 \times 5 =$ _____ $3 \times 3 =$ _____

1×8	2×4	9×4	0×7	6×3	5×1
6×8	4×4	6×0	7×6	5×6	3×4

Go to Assignment Booklet 8B.

Number completed	
Number correct	

DAY 18: LOOKING BACK

Today you will show your teacher what you have learned about 3-D solids, 2-D shapes, directions, and temperature by completing some review questions in your Assignment Booklet. You may want to look back through your Student Module Booklet if you have difficulty with any of the questions.

You will also do a Multiplication Number Facts exercise to send to your teacher.

Go to Assignment Booklet 8B.

When you have finished today's assignment, complete the Student's Checklist and Student's Comments before submitting your work to the teacher.

SUMMARY

Luke checked his e-mail every day. He and Sarah were exchanging e-mails regularly.

File Edit View Insert Format Tools Help

Send Mail

To... luke@e-mail.net

Cc...

Subject... Space and Shape

Hi Luke,

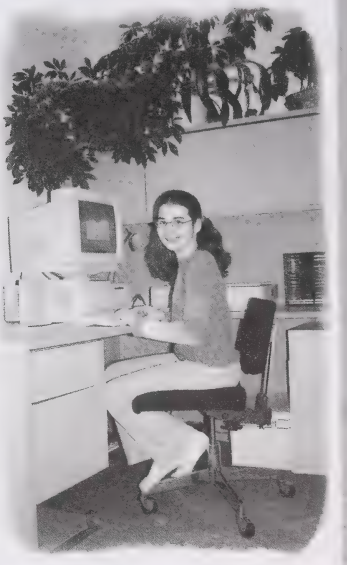
Look at the photo of me at the computer! Sending e-mail is much faster than regular mail! I have used some of the websites in my Student Module Booklets to practise my math facts and do research about geometric solids.

I have just finished Module 8 called Space and Shape, and I learned lots. Now I can

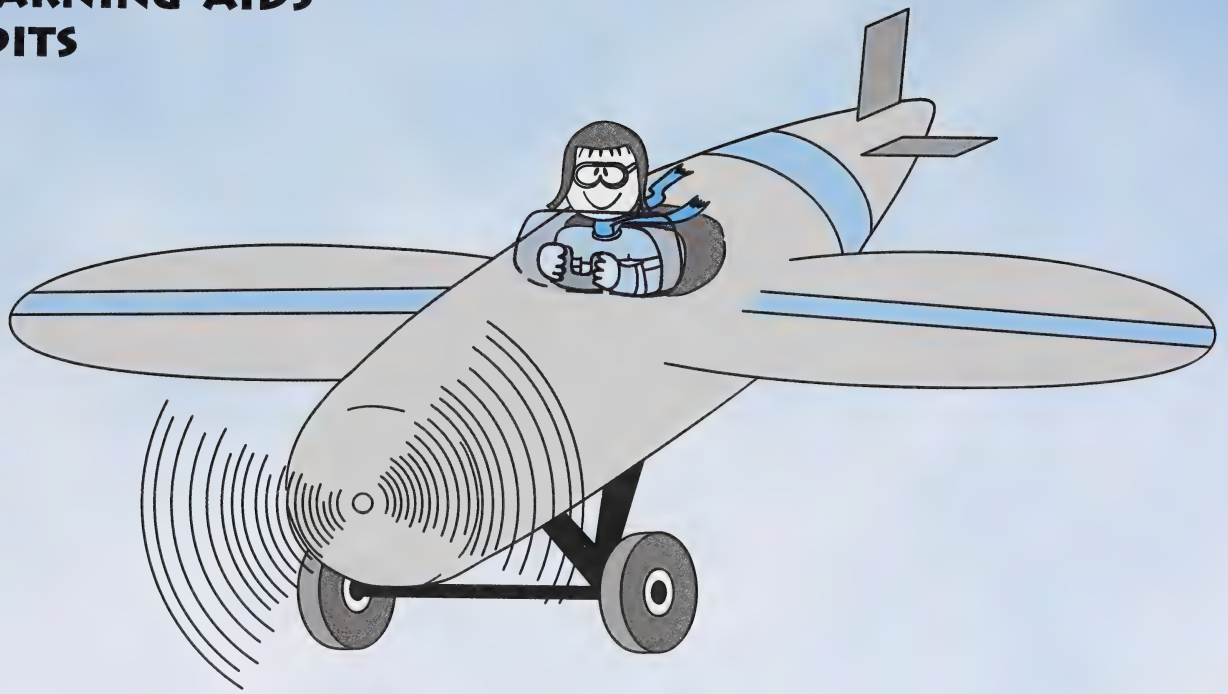
- find and count faces, vertices, and edges on 3-D solids
- describe pyramids and prisms
- determine perpendicular and parallel lines
- compare and contrast 3-D objects
- find congruent objects
- graph a number line
- estimate, read, and record temperatures

I'm also getting much faster at doing multiplication facts. How about you?

Sarah



APPENDIX



GLOSSARY

base: a surface of a geometric shape or solid on which it can stand

compare: to look for similarities or how things are alike

compass rose: a symbol on a map that shows the directions

congruent: identical or exactly the same in size and shape

contrast: to look for differences or how things are not alike

degrees Celsius: standard units to measure temperature in which 0 degrees is the temperature at which water freezes and 100 degrees is the temperature at which water boils

edge: where two faces meet

face: a flat side of a solid

geometric solids: 3-dimensional objects that can be measured for length, width, and depth

geometry: the study of shapes and solids

intersect: to meet or cross

horizontal: stretching sideways (horizontal lines go across the page)

line: a long, thin mark

meteorologist: a person trained in the science of the conditions that tell about weather

number line: a line that has smaller numbered lines equally spaced along it

net: a pattern for making a geometric solid

parallel: lines that are the same distance apart at every point; parallel lines will never meet

perpendicular: lines that meet or cross to form a square corner

prism: a solid with two similar bases and at least three flat rectangular sides

pyramid: a solid with one base and flat sides or faces that meet at a point

solid: an object with length, width, and depth

three dimensional: having three dimensions and can be measured in three ways—for length, width, and depth

two dimensional: having two dimensions and can be measured in two ways—for length and width

vertex: a point where two lines meet (a corner)

vertical: stretching straight up and down (vertical lines go up and down)

vertices: the plural of vertex; more than one vertex

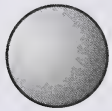
ANSWER KEY TO THE SELF-MARKING ACTIVITIES

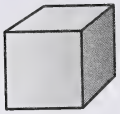
DAY 1: LESSON 2

1. a. sphere b. cube c. pyramid d. cone e. cylinder

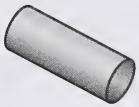
2. Your answers may be different. Here are some examples of 3-D objects you may have found:


candle, paperweight, roof


tennis ball, bubblegum, bead


sugar cube, gift box, dice, ice cube, stove


candle, party hat, ice-cream cone


soup can, paper-towel roll, candle

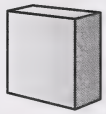
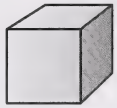
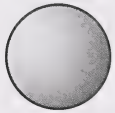
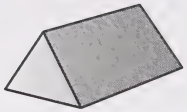
DAY 1: LESSON 3

1. rectangular prism
2. triangular prism
3. rectangular prism
4. triangular prism

DAY 2: LESSON 1

1. Yes, the rectangular prism has rectangles for faces. It has six rectangular faces.
2. It is called a prism because it has two ends that are the same and at least three rectangular sides or faces.
3. Yes, the triangular prism has rectangles for faces. It has three rectangular faces.
4. It is called a prism because it has two ends that are the same and at least three rectangular sides or faces.

DAY 2: LESSON 2

Solid	Name of Solid	Number of Faces	Number of Edges	Number of Vertices
	square-based pyramid	5	8	5
	rectangular prism	6	12	8
	cube	6	12	8
	sphere	0	0	0
	triangular prism	5	9	6
	cylinder	2	2	0
	cone	1	1	1

Timed Exercise Answers

$3 \times 7 = \mathbf{21}$ $2 \times 7 = \mathbf{14}$ $9 \times 5 = \mathbf{45}$ $5 \times 4 = \mathbf{20}$ $5 \times 3 = \mathbf{15}$ $7 \times 5 = \mathbf{35}$ $6 \times 2 = \mathbf{12}$

$4 \times 8 = \mathbf{32}$ $4 \times 7 = \mathbf{28}$ $2 \times 0 = \mathbf{0}$ $3 \times 1 = \mathbf{3}$ $9 \times 5 = \mathbf{45}$ $3 \times 3 = \mathbf{9}$

2 × 3 = **6**	7 × 2 = **14**	2 × 5 = **10**	9 × 1 = **9**	9 × 0 = **0**	6 × 6 = **36**
6 × 4 = **24**	6 × 5 = **30**	8 × 6 = **48**	4 × 4 = **16**	6 × 7 = **42**	9 × 3 = **27**

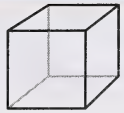
DAY 3: LESSON 1

1. circle 2. square 3. triangle 4. rectangle

DAY 3: LESSON 2

1. sphere

2.

	Name of Solid	□	□	○	△
	cube	6	0	0	0
	sphere	0	0	0	0
	pyramid	1	0	0	4
	cone	0	0	1	0
	triangular prism	0	3	0	2
	cylinder	0	0	2	0
	rectangular prism	0	6	0	0

3. You should have drawn your face showing its shape. Does the shape of your face resemble a square, rectangle, circle, oval (a stretched-out circle), or triangle?

DAY 4: LESSON 1

1. sphere
2. triangular prism
3. cone (also a sphere)
4. rectangular prism
5. cube
6. cylinder

DAY 4: LESSON 2

1. No. A sphere has no faces.

2. a. triangular prism b. cube c. rectangular prism d. square-based pyramid

DAY 5: LESSON 1

1. Each rectangular prism has six faces.

2. Each has twelve edges.

3. Each has eight vertices.

4. One rectangular prism has faces that are all rectangles. The other has two faces that are squares and the other faces are rectangles.

5. They have the same number of faces, edges, and vertices.

6. The triangular prism has two triangular faces, nine edges, and six vertices. The rectangular prism has six rectangular faces, twelve edges, and eight vertices.

7. It is a prism because it is a solid with two bases or ends that are the same and at least three flat rectangular faces or sides.

8. The pyramids all come to a point.

9. Prisms have rectangles for at least three of their faces or sides and two bases or ends that are the same.

DAY 5: LESSON 2

1. a. edge	b. vertex	c. base	d. face
2. a. face	b. vertex	c. base	d. edge
3. a. vertex	b. edge	c. face	d. base

Timed Exercise Answers

$4 \times 7 = \mathbf{28}$ $3 \times 9 = \mathbf{27}$ $7 \times 3 = \mathbf{21}$ $6 \times 6 = \mathbf{36}$ $4 \times 4 = \mathbf{16}$ $2 \times 1 = \mathbf{2}$ $7 \times 2 = \mathbf{14}$

$7 \times 5 = \mathbf{35}$ $7 \times 7 = \mathbf{49}$ $2 \times 2 = \mathbf{4}$ $7 \times 0 = \mathbf{0}$ $5 \times 2 = \mathbf{10}$ $3 \times 3 = \mathbf{9}$

6 × 3 = **18**	7 × 1 = **7**	8 × 5 = **40**	9 × 4 = **36**	9 × 2 = **18**	7 × 6 = **42**
5 × 4 = **20**	5 × 5 = **25**	2 × 6 = **12**	3 × 4 = **12**	6 × 5 = **30**	2 × 3 = **6**

DAY 6: LESSON 1

1. A rectangular-based pyramid stands on its **rectangular** face.
   The rectangular face is its **base**.

2. A square-based pyramid stands on its **square** face.
   The square face is its **base**.

3. a. vertex b. face c. base d. edge
   e. The name of this pyramid is a **triangular-based pyramid**.

DAY 6: LESSON 1 TO DAY 7: LESSON 2

4. a. face b. edge c. base d. vertex
   e. The name of this pyramid is a **rectangular-based pyramid**.

5. a. face b. vertex c. base d. edge
   e. The name of this pyramid is a **square-based pyramid**.

DAY 6: LESSON 2

You built models of pyramids and discussed the similarities and differences between them with your home instructor. Then you discussed the similarities and differences between the pyamids with your home instructor.

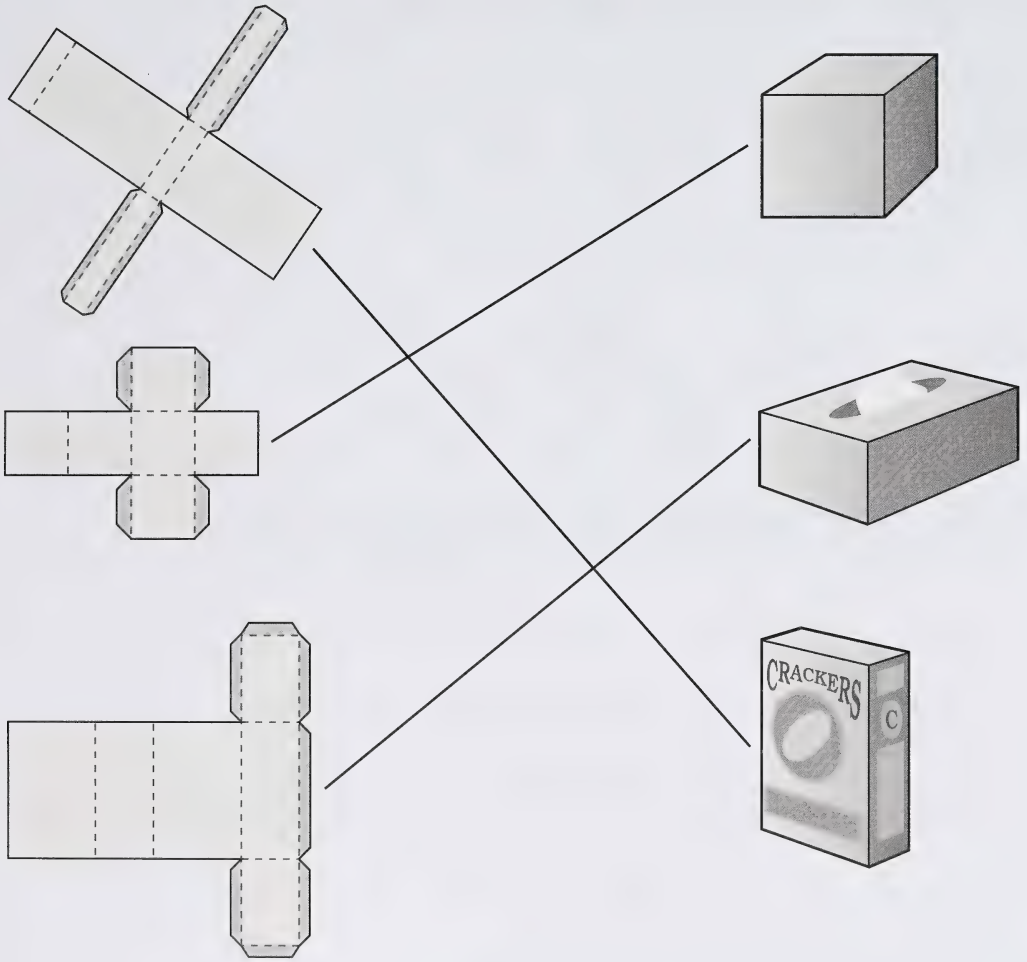
DAY 7: LESSON 2

1. No. It has only five faces. A rectangular prism has six faces.

2. a. tissue box

   b. toothpaste box

DAY 8: LESSON 2



DAY 8: LESSON 2 AND DAY 9

Timed Exercise Answers

$3 \times 4 = \mathbf{12}$ $2 \times 9 = \mathbf{18}$ $6 \times 3 = \mathbf{18}$ $0 \times 6 = \mathbf{0}$ $2 \times 4 = \mathbf{8}$ $6 \times 5 = \mathbf{30}$ $7 \times 5 = \mathbf{35}$

$4 \times 8 = \mathbf{32}$ $2 \times 1 = \mathbf{2}$ $7 \times 6 = \mathbf{42}$ $5 \times 5 = \mathbf{25}$ $8 \times 3 = \mathbf{24}$ $3 \times 3 = \mathbf{9}$

9 × 3 = **27**	7 × 2 = **14**	8 × 4 = **32**	6 × 4 = **24**	3 × 1 = **3**	7 × 7 = **49**
5 × 9 = **45**	4 × 5 = **20**	2 × 3 = **6**	4 × 4 = **16**	6 × 6 = **36**	5 × 3 = **15**

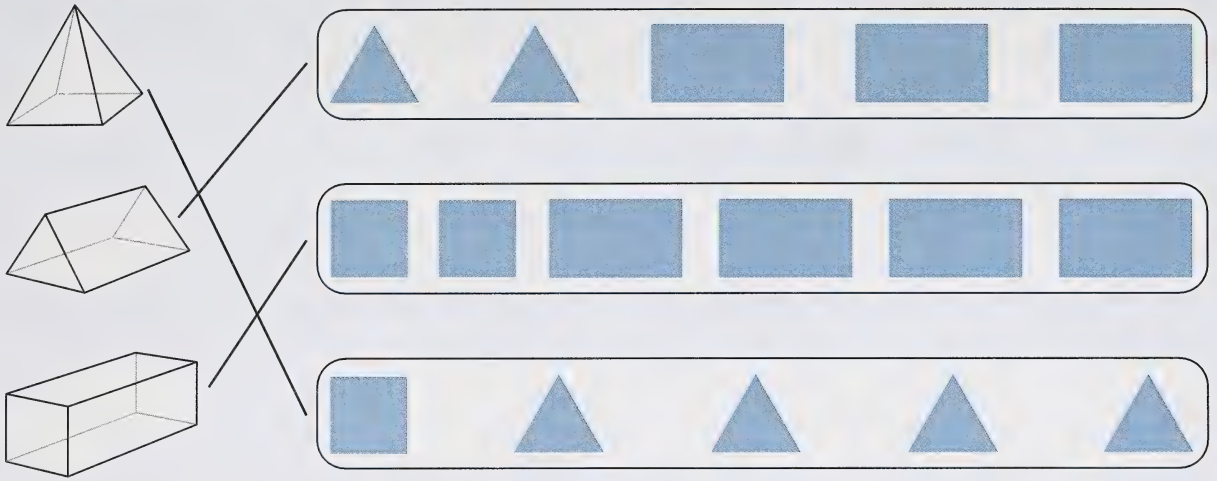
DAY 9

1. The cube and the rectangular prism have the same number of faces, edges, and vertices.

2. The cube has square faces and the rectangular prism has square and rectangular faces.

3. Which solid did you choose? Check your information with the chart in Lesson 2 of Day 2 that tells you how many faces, edges, and vertices each solid has and the chart in Lesson 2 of Day 3 that describes the types of faces each solid has.

4. a.



5. Many things are possible. Here are some examples.

Spheres	Pyramids	Cubes	Rectangular Prisms	Cylinders
ball	toy blocks	boxes	cereal box	paper towel roll
orange	candle	ice cubes	toothpaste box	toilet paper roll
light fixture	paperweight	sugar cubes	chest of drawers	storage containers

DAY 9 TO DAY 10: LESSON 3

6. You need eight straws and five balls of clay for a square-based or rectangular-based pyramid, and six straws and four balls of modelling clay for a triangular pyramid. Your prediction should have been correct.

7. You could build a cube or a rectangular prism.

DAY 10: LESSON 1

No, parallel lines or edges of a cube or rectangular prism do not intersect. The lines or edges are an equal distance apart and never meet.

DAY 10: LESSON 3

1. No. These lines are not perpendicular. They do not form a square corner where they meet.

2. No. The lines are not parallel because they are not opposite from each other, and they are not an equal distance apart.

DAY 11

1. a. cube
   b. triangular prism
   c. square-based pyramid
   d. rectangular prism
   e. cylinder
   f. cone

2. When you compare the rectangular prism and rectangular-based pyramid, you should find they both have the following:

   - faces
   - vertices
   - edges
   - a rectangular base
   - parallel and perpendicular lines
   - lines that intersect

3. The following are differences or contrasts between a rectangular prism and a rectangular-based pyramid:

   - The pyramid has one rectangular base, but the prism has two rectangular bases.
   - The pyramid has triangular faces, but the prism has only rectangular faces.
   - The pyramid has a vertex where all faces meet, but the prism doesn't.
   - The pyramid has four square corners, but the prism has eight.
   - All the lines on the prism form square corners, but the pyramid has only some that do.

4.

How Many?	Rectangular Prism	Rectangular-Based Pyramid
Faces	6	5
Edges	12	8
Vertices	8	5

5.

How Many?	Triangular Prism	Triangular-Based Pyramid
Faces	5	4
Edges	9	6
Vertices	6	4

6. The main difference between a prism and pyramid with the same base shape is that the prism has more faces, edges, and vertices.

Timed Exercise Answers

$6 \times 2 = \mathbf{12}$ $2 \times 7 = \mathbf{14}$ $6 \times 6 = \mathbf{36}$ $0 \times 8 = \mathbf{0}$ $9 \times 4 = \mathbf{36}$ $3 \times 6 = \mathbf{18}$ $7 \times 5 = \mathbf{35}$

$5 \times 5 = \mathbf{25}$ $8 \times 1 = \mathbf{8}$ $7 \times 7 = \mathbf{49}$ $2 \times 5 = \mathbf{10}$ $4 \times 7 = \mathbf{28}$ $2 \times 1 = \mathbf{2}$

$9 \times 3 = \mathbf{27}$	$6 \times 5 = \mathbf{30}$	$8 \times 2 = \mathbf{16}$	$3 \times 4 = \mathbf{12}$	$3 \times 3 = \mathbf{9}$	$0 \times 1 = \mathbf{0}$
$3 \times 8 = \mathbf{24}$	$4 \times 6 = \mathbf{24}$	$7 \times 3 = \mathbf{21}$	$5 \times 4 = \mathbf{20}$	$6 \times 7 = \mathbf{42}$	$3 \times 5 = \mathbf{15}$

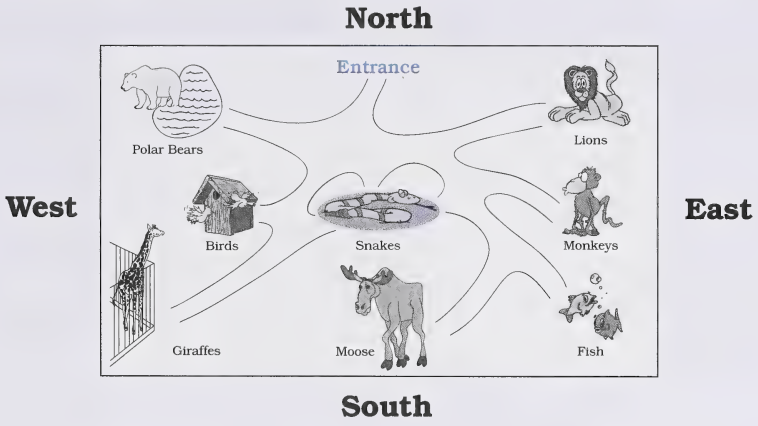
DAY 12: LESSON 2

If all the faces match, the boxes are congruent. You can use the following methods to prove the boxes are congruent.

- Place one box on top of the other to match up the faces.
- Trace the faces of each box on paper, then match them up.
- Measure the faces of each box to see if they have the same measurements.

DAY 13: LESSON 3

1. a.



2. a. The polar bears are **north** of the giraffes.
   b. The monkeys are **south** of the lions.
   c. The snakes are **east** of the birds.
   d. The moose are **west** of the fish.

3. The fish are farther south.
4. The moose are farther east.
5. The lions are farther north.
6. The polar bears are farther west.

DAY 14

Timed Exercise Answers

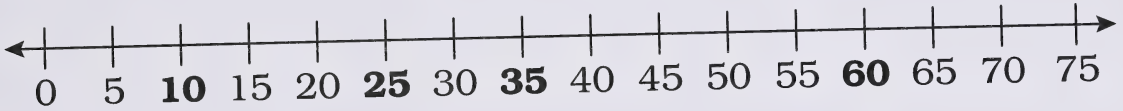
$6 \times 2 = \mathbf{12}$ $3 \times 7 = \mathbf{21}$ $6 \times 6 = \mathbf{36}$ $1 \times 9 = \mathbf{9}$ $5 \times 4 = \mathbf{20}$ $2 \times 9 = \mathbf{18}$ $6 \times 8 = \mathbf{48}$

$9 \times 5 = \mathbf{45}$ $9 \times 3 = \mathbf{27}$ $7 \times 7 = \mathbf{49}$ $7 \times 6 = \mathbf{42}$ $5 \times 4 = \mathbf{20}$ $6 \times 4 = \mathbf{24}$

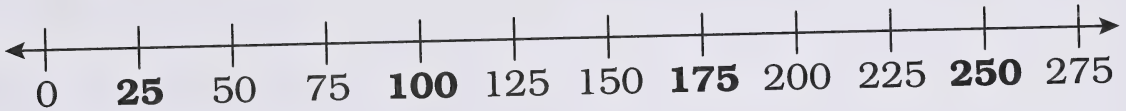
7 × 5 = **35**	6 × 3 = **18**	8 × 1 = **8**	0 × 4 = **0**	2 × 2 = **4**	1 × 1 = **1**
4 × 8 = **32**	4 × 2 = **8**	5 × 3 = **15**	7 × 4 = **28**	3 × 7 = **21**	4 × 4 = **16**

DAY 15: LESSON 1 TO DAY 17: LESSON 2

DAY 15: LESSON 1

1. 

The numbers show a pattern of counting by **5s** (or **fives**).

2. 

The numbers show a pattern of counting by **25s** (or **twenty-fives**).

DAY 16

1. 22°C 2. 11°C 3. –9°C 4. –18°C

DAY 17: LESSON 2

Your estimated temperatures will vary and be based on what you know about temperature ranges.

Actual temperatures will also vary depending on the time of year, but may be similar to the following:

Places	Estimate °C	Actual °C
freezer (inside)		−12°C
fridge (inside)		10°C
bedroom		20°C
outside		12°C
cup of warm tap water		50°C
my body		37°C
cup of hot tea		80°C

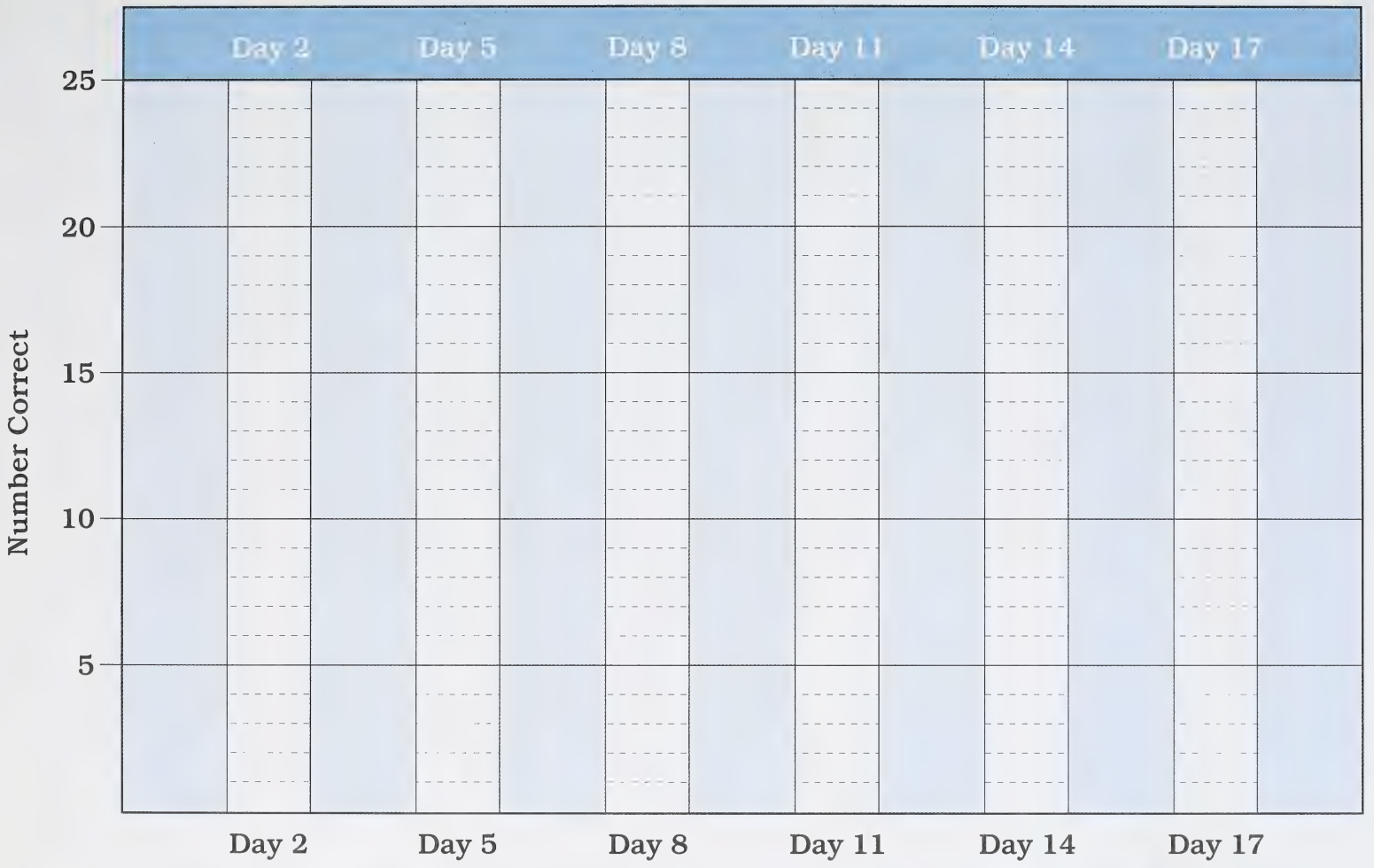
Timed Exercise Answers

$7 \times 2 = \mathbf{14}$ $5 \times 7 = \mathbf{35}$ $4 \times 6 = \mathbf{24}$ $9 \times 3 = \mathbf{27}$ $5 \times 8 = \mathbf{40}$ $2 \times 8 = \mathbf{16}$ $8 \times 4 = \mathbf{32}$

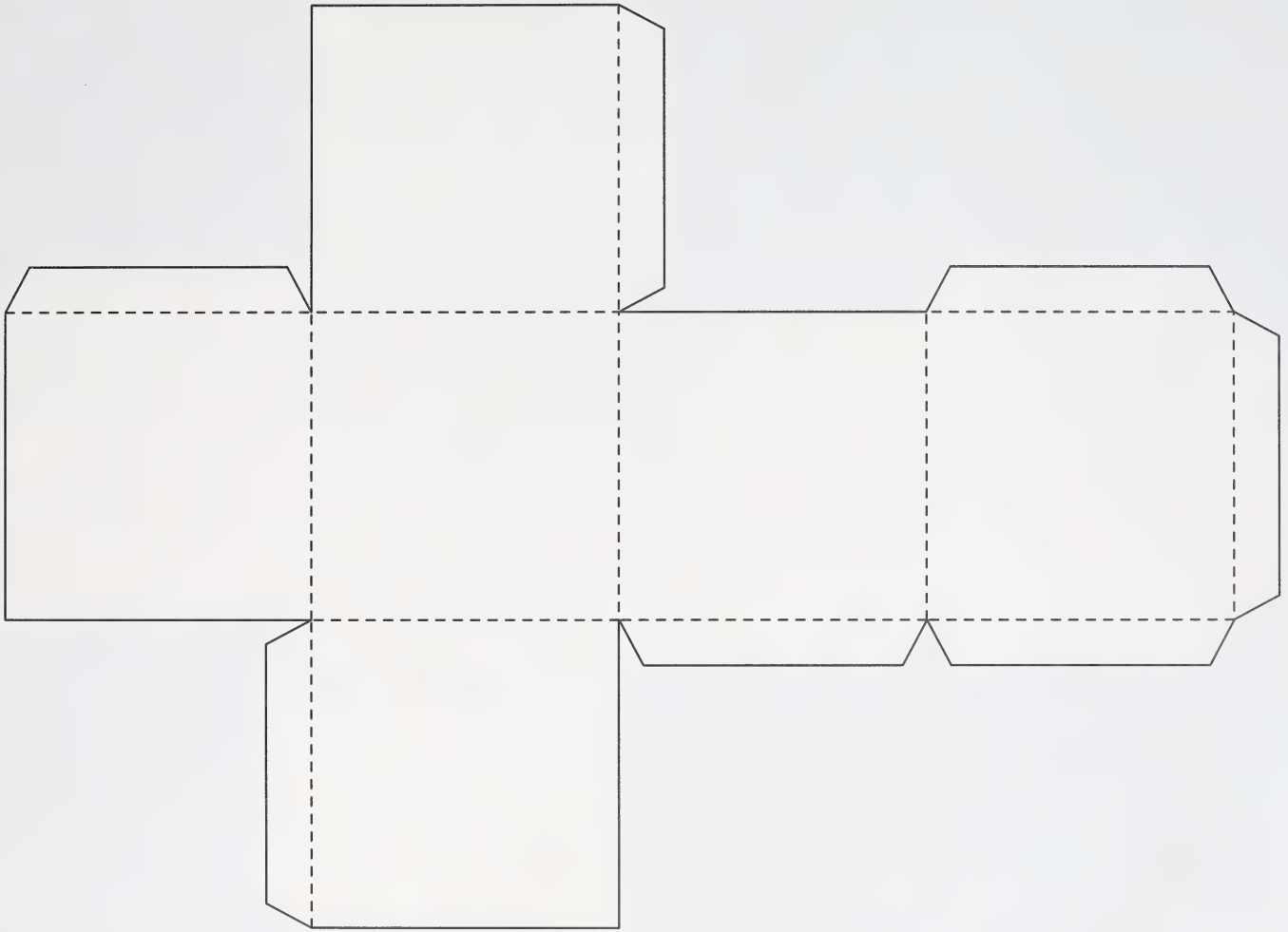
$6 \times 6 = \mathbf{36}$ $5 \times 3 = \mathbf{15}$ $6 \times 7 = \mathbf{42}$ $7 \times 7 = \mathbf{49}$ $5 \times 5 = \mathbf{25}$ $3 \times 3 = \mathbf{9}$

1 × 8 = **8**	2 × 4 = **8**	9 × 4 = **36**	0 × 7 = **0**	6 × 3 = **18**	5 × 1 = **5**
6 × 8 = **48**	4 × 4 = **16**	6 × 0 = **0**	7 × 6 = **42**	5 × 6 = **30**	3 × 4 = **12**

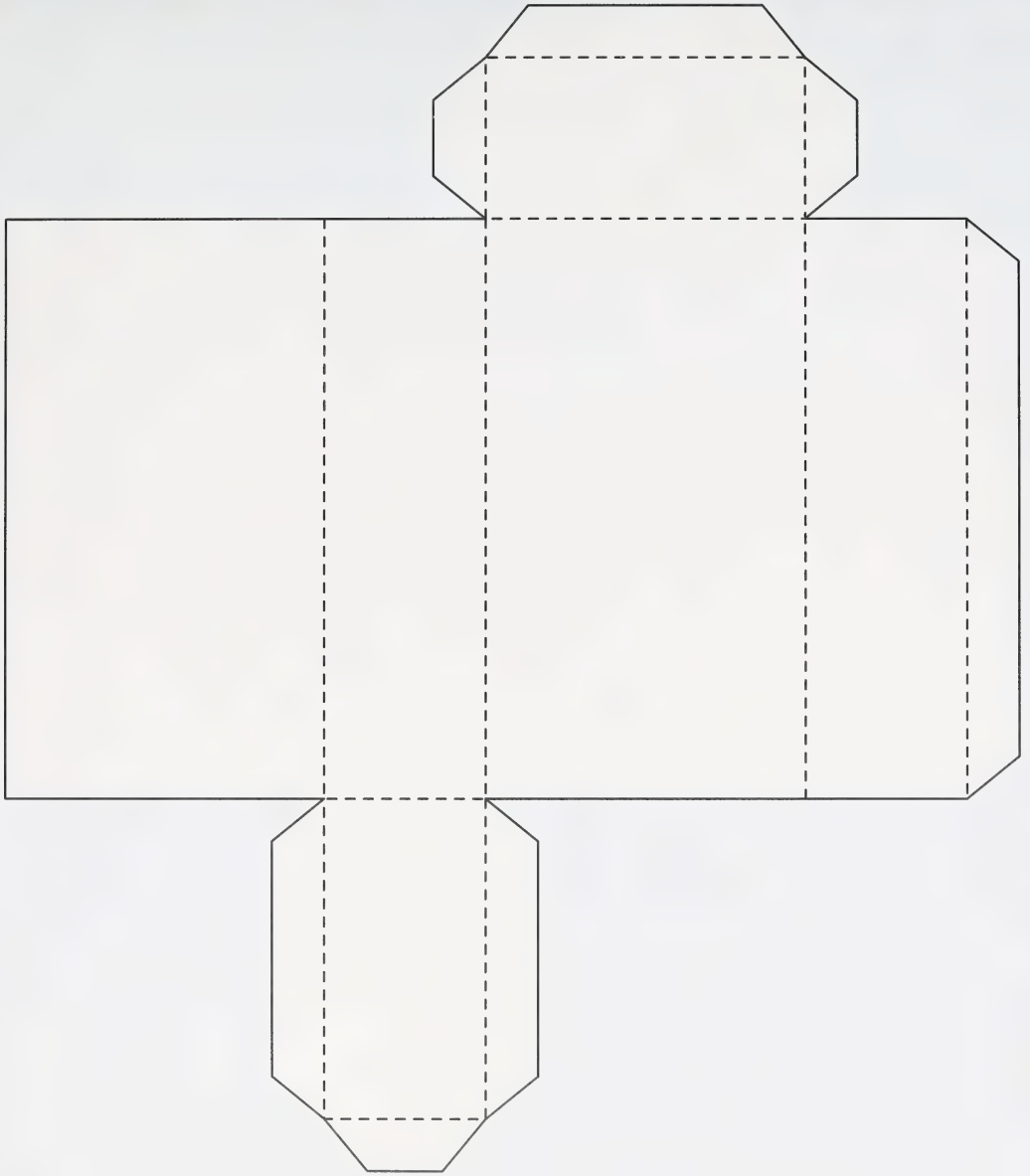
MATH FACTS GRAPH



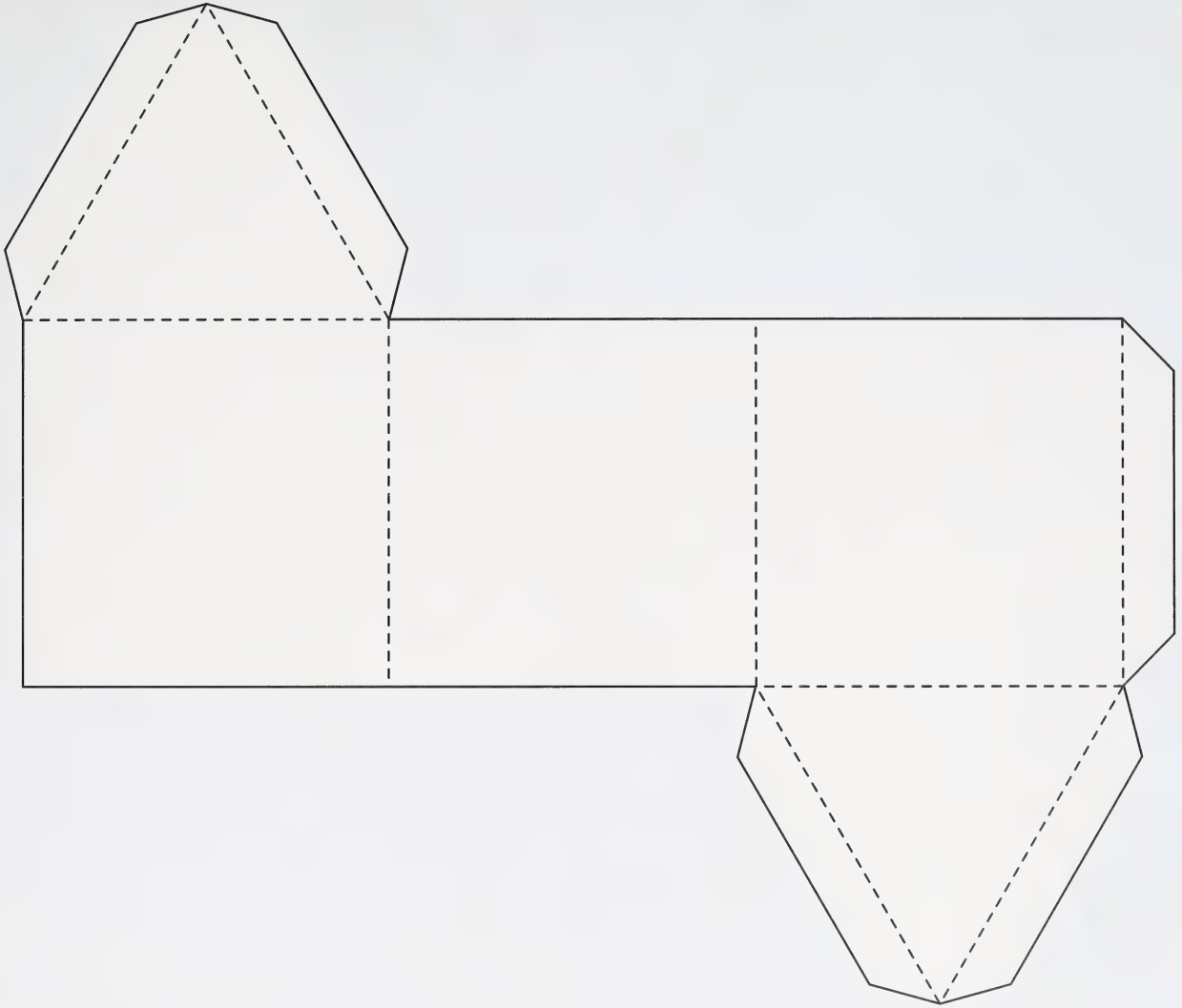
PATTERNS FOR GEOMETRIC SOLIDS - NET FOR A CUBE



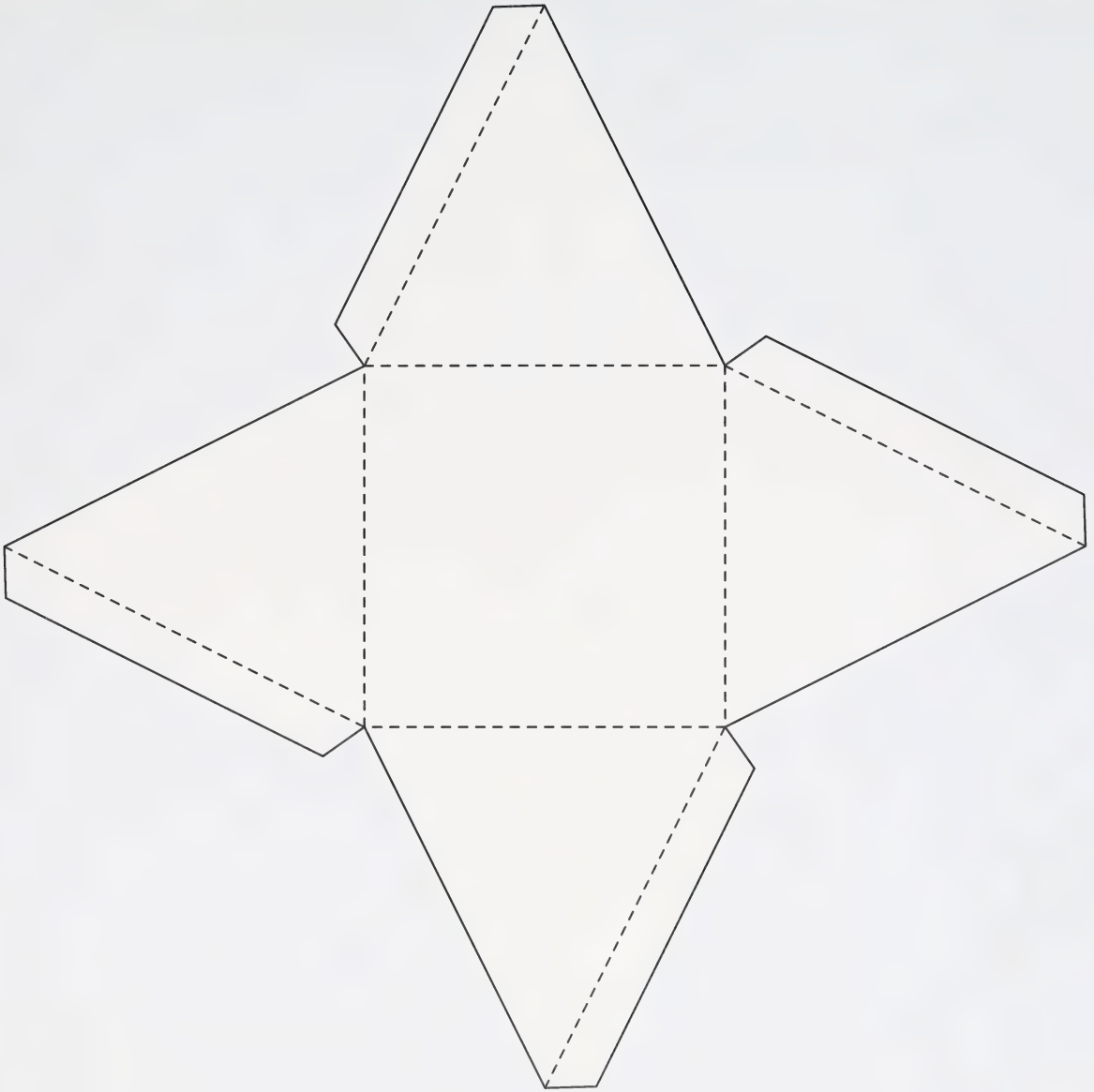
NET FOR A RECTANGULAR PRISM WITH ALL RECTANGULAR FACES



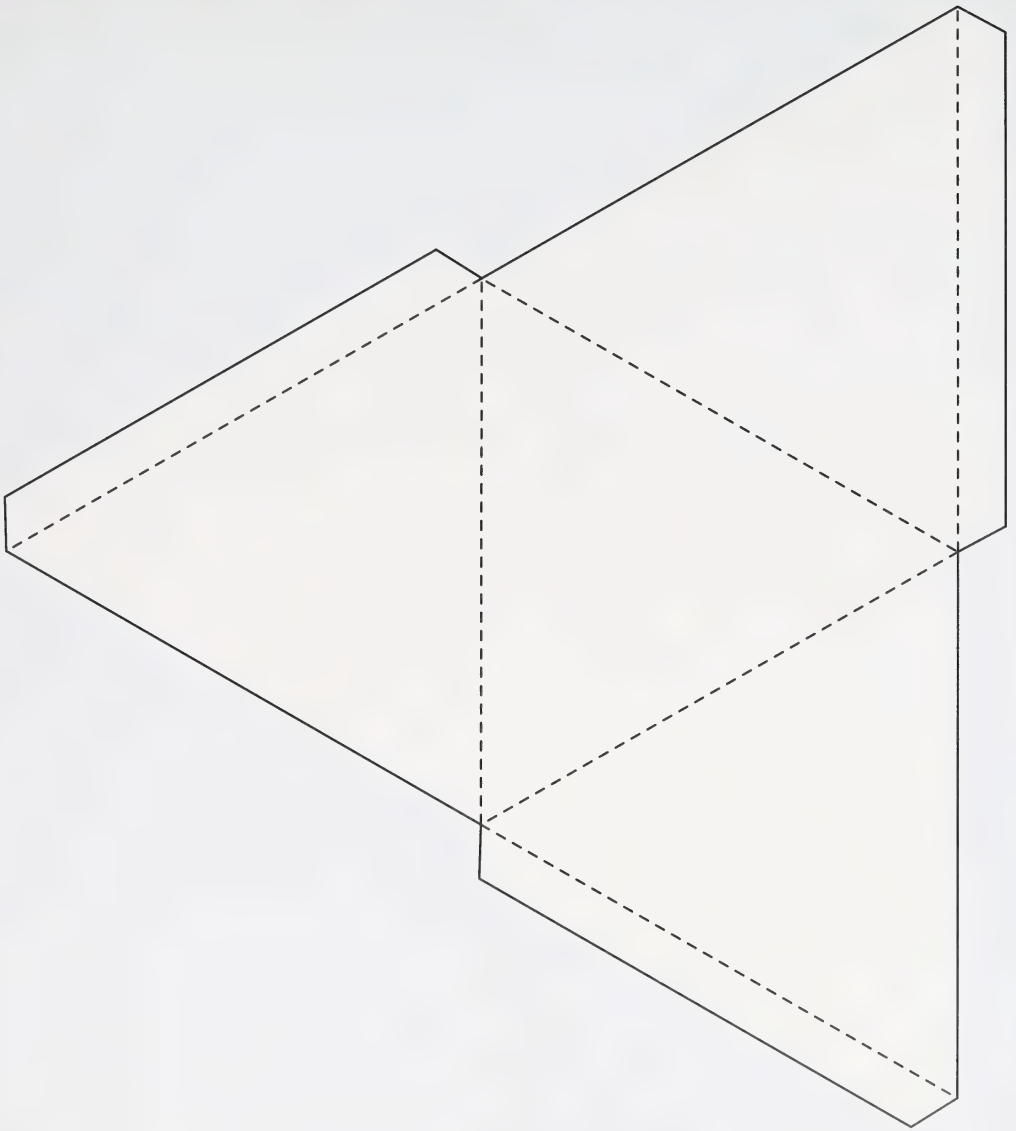
NET FOR A TRIANGULAR PRISM



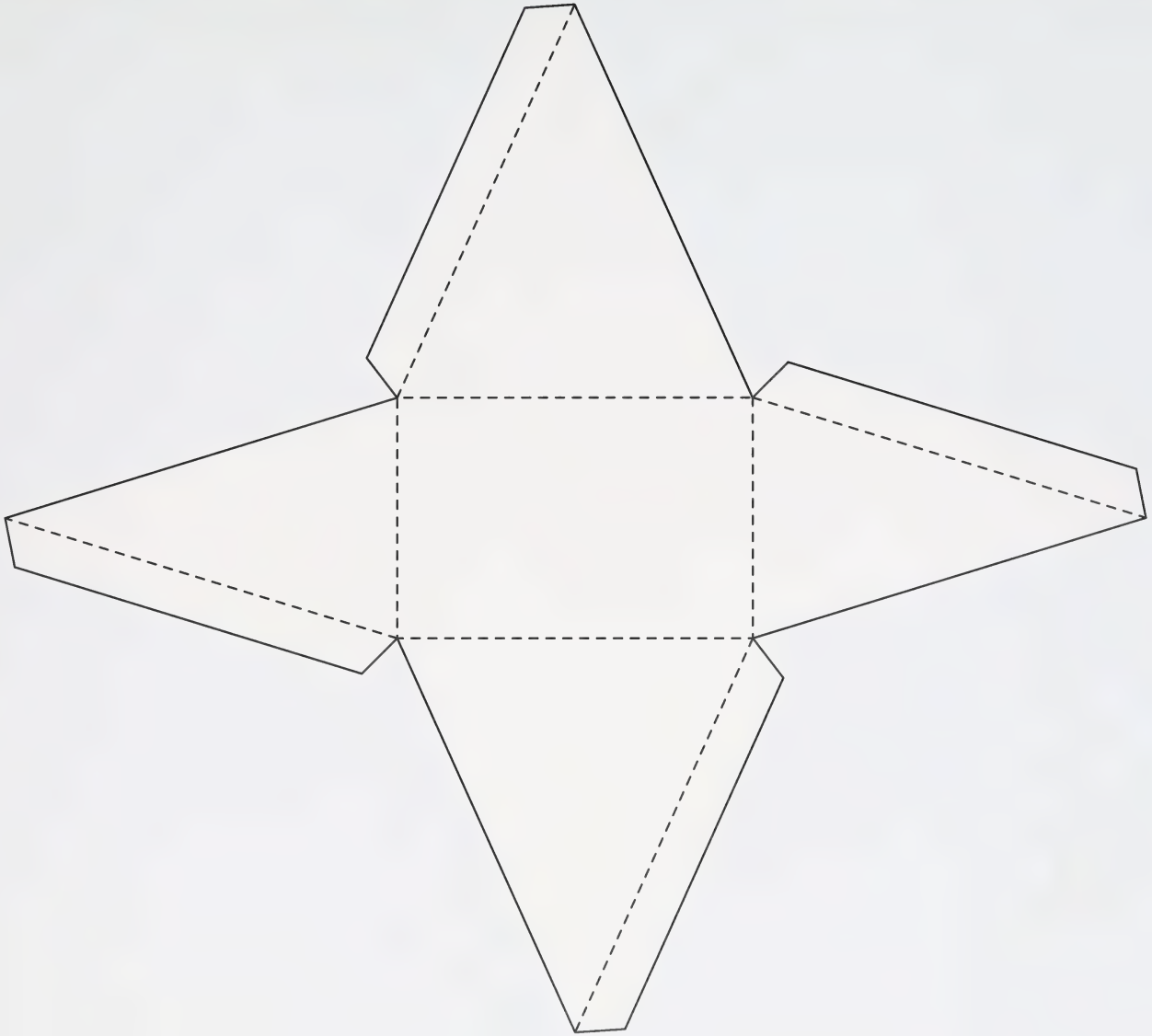
NET FOR A SQUARE-BASED PYRAMID



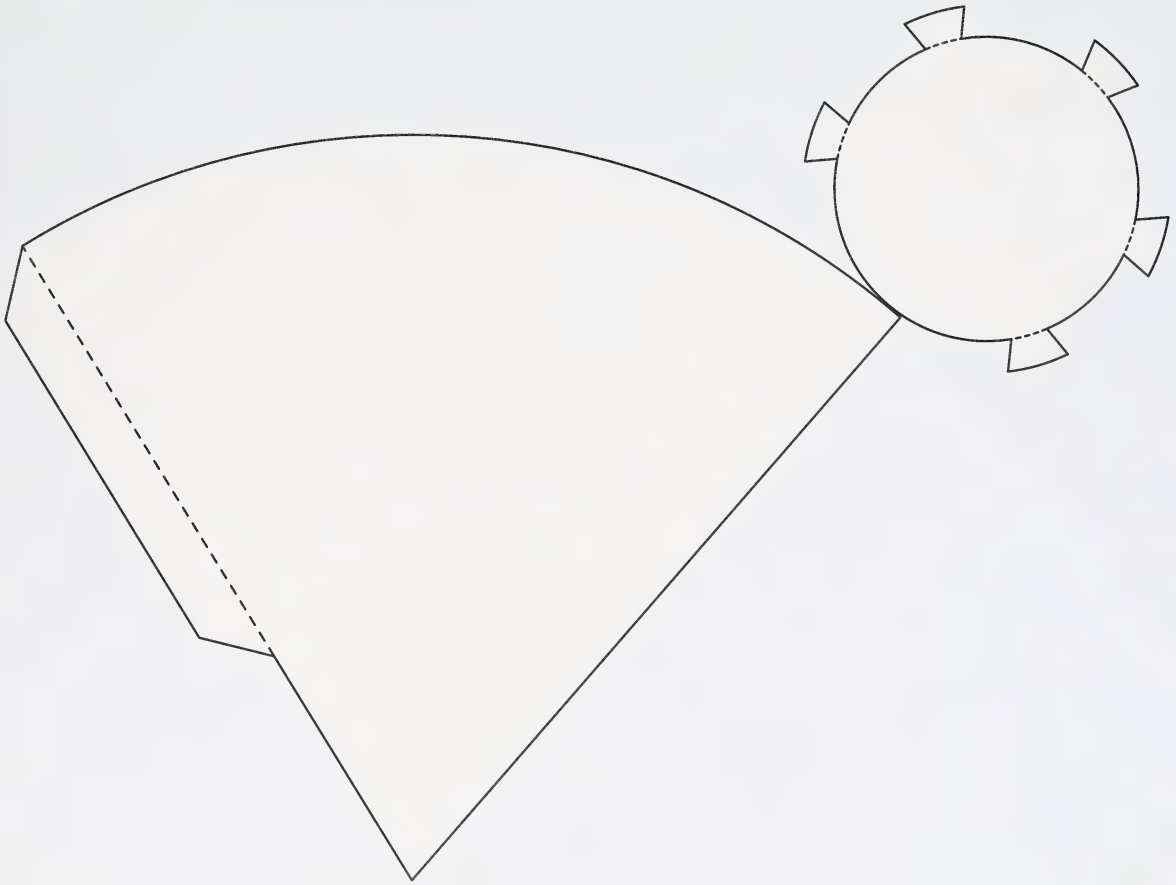
NET FOR A TRIANGULAR-BASED PYRAMID



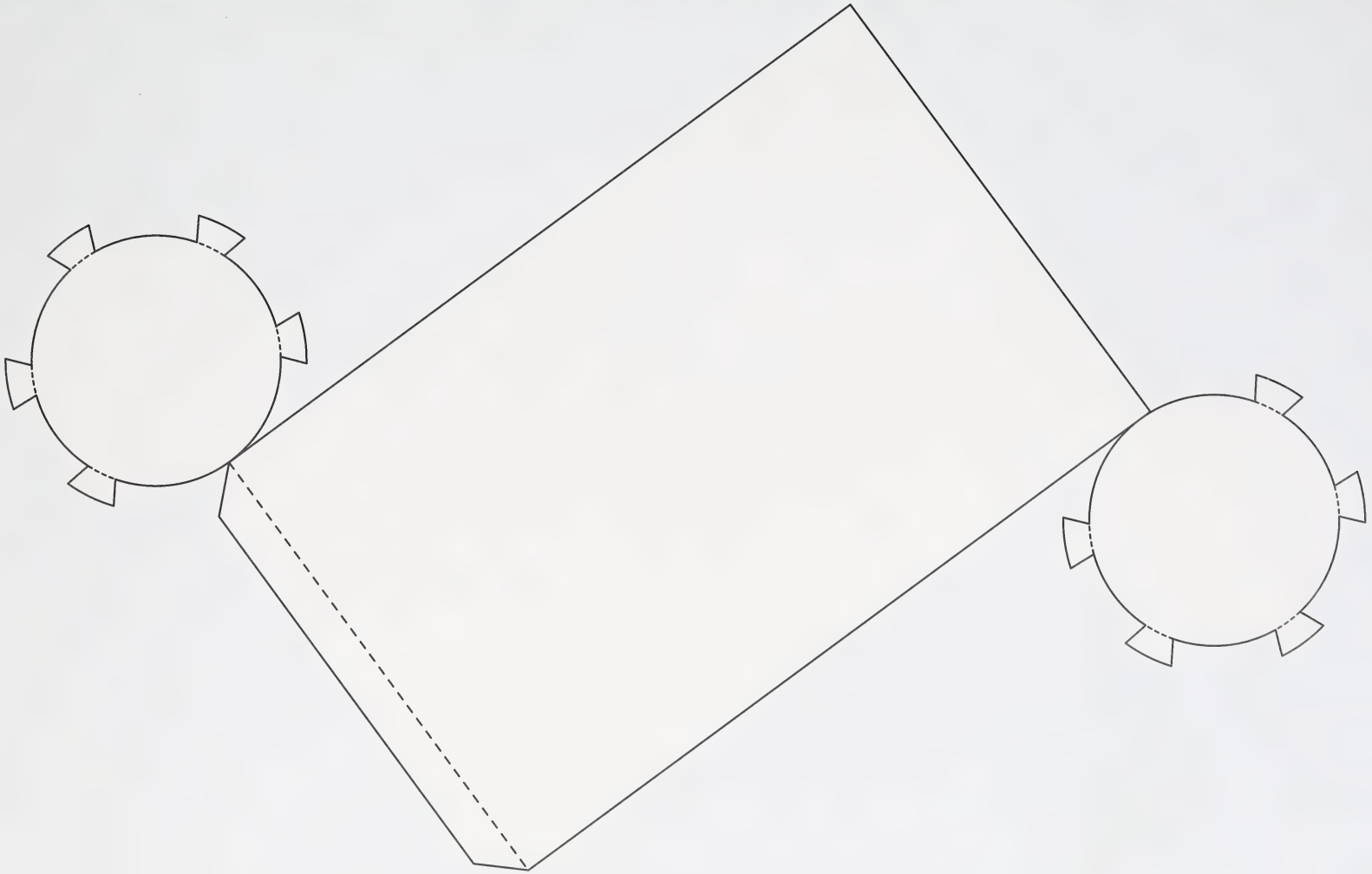
NET FOR A RECTANGULAR-BASED PYRAMID



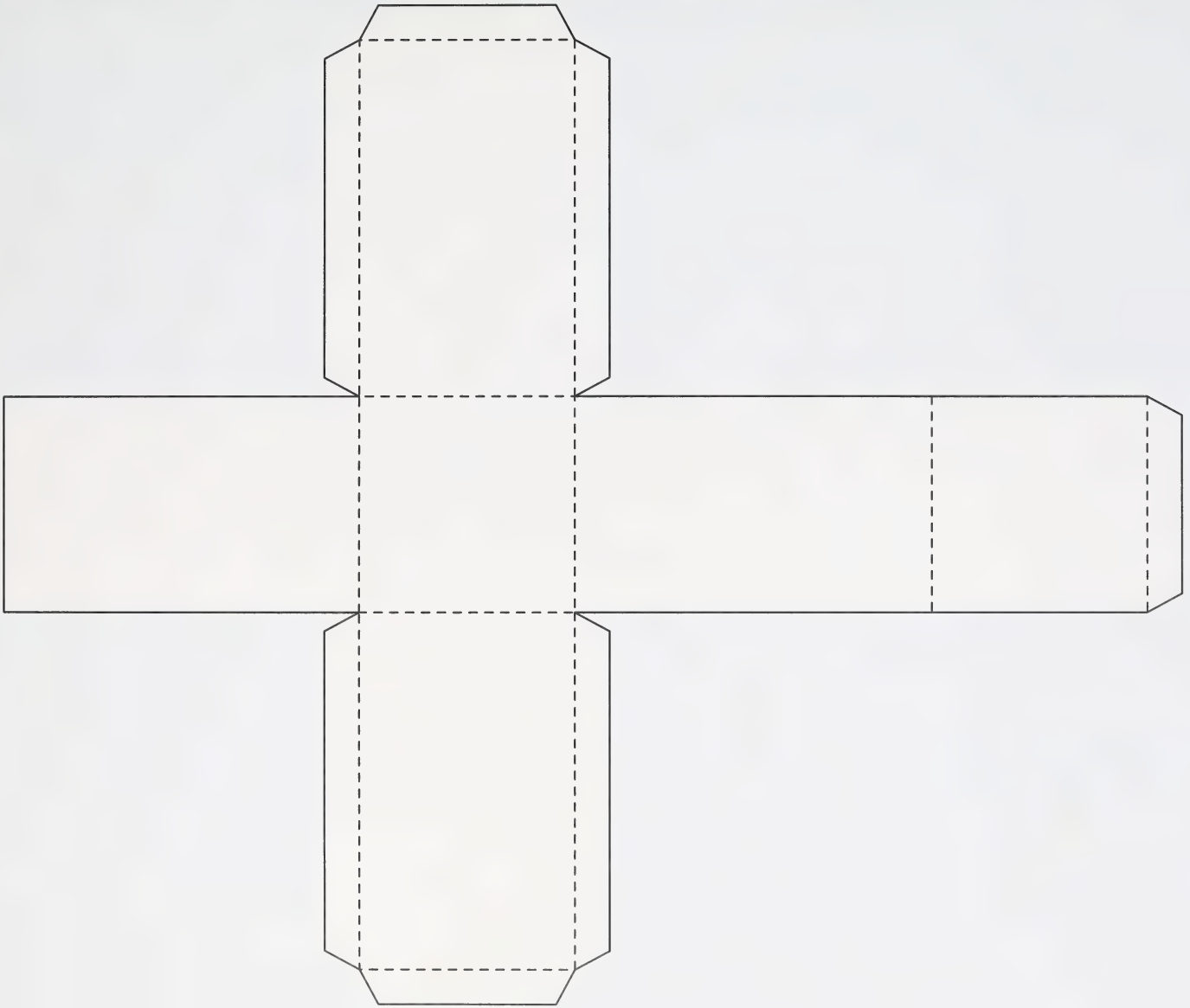
NET FOR A CONE



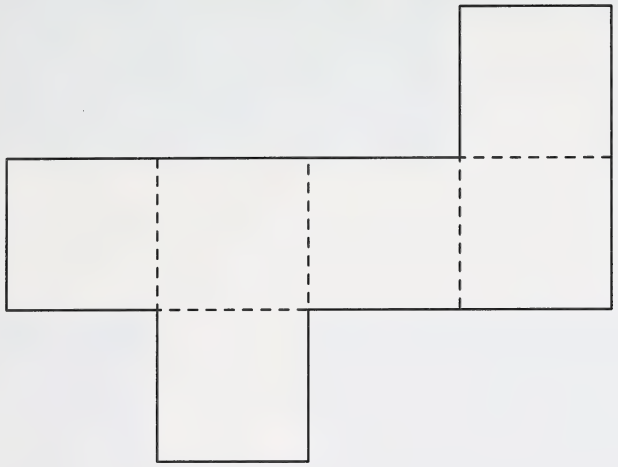
NET FOR A CYLINDER

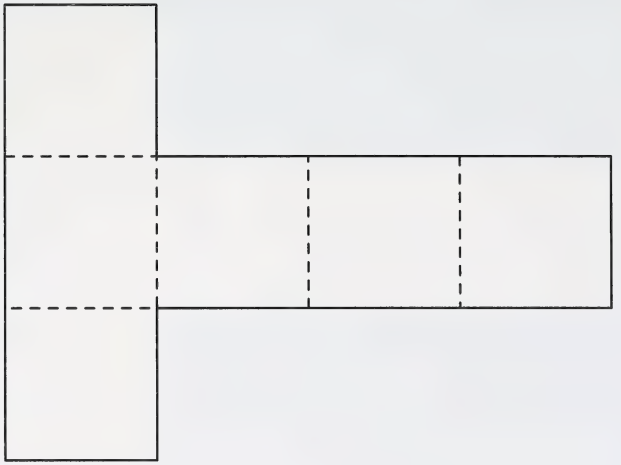


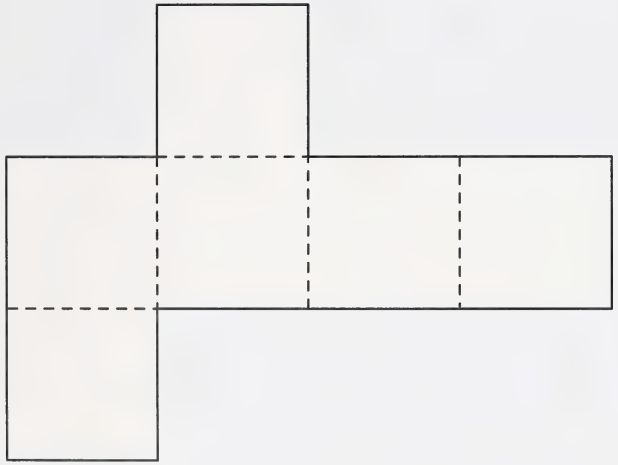
NET FOR A RECTANGULAR PRISM WITH 2 SQUARE FACES

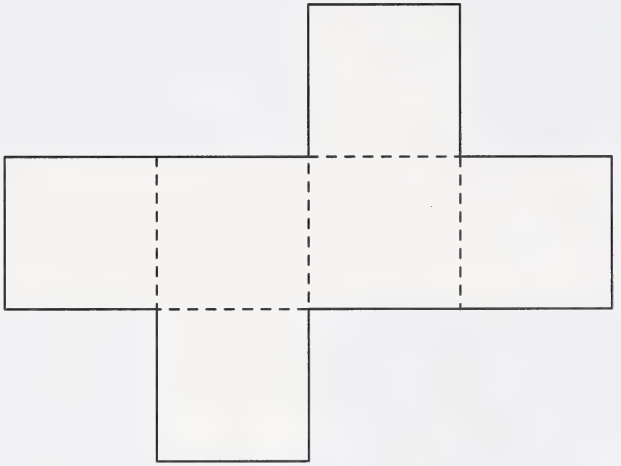


NETS

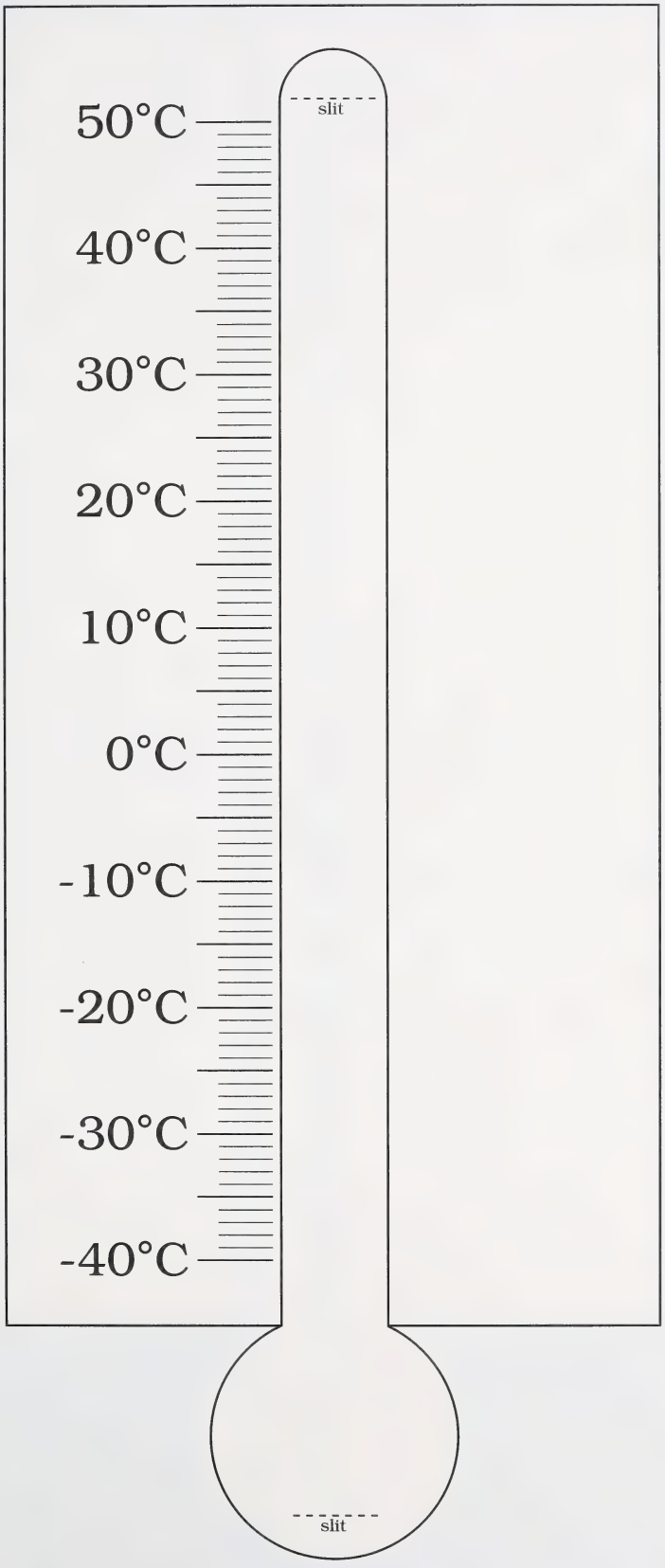








THERMOMETER



TEMPERATURE BINGO CARDS

15°C	30°C	13°C	-2°C	18°C
8°C	-17°C	20°C	4°C	-22°C
-9°C	3°C	Free Space	25°C	-12°C
19°C	42°C	-5°C	-7°C	-34°C
0°C	-12°C	33°C	16°C	35°C

-5°C	-33°C	19°C	-22°C	28°C
50°C	34°C	-20°C	3°C	-2°C
17°C	-10°C	Free Space	27°C	30°C
-9°C	40°C	-15°C	-12°C	-25°C
2°C	-10°C	-33°C	15°C	45°C

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